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ABSTRACT

The return on investment (ROI) obtained by enterprises that invest in training was examined through case studies of seven Australian work organizations. The case study organizations included a government-owned transportation company, a privately owned company, a major nongovernmental charitable organization, a publicly listed corporation, and two subsidiaries of large multinational corporations. The two main forms of data considered were time series and matched pairs before and after training. Subjective and objective data were also used in several case studies to illustrate the diversity of data sources available to organizations and the use to which such data can be put. The following were among the major findings: (1) the financial and other returns from a well-designed training program can be substantial in all organizations, regardless of the organizations' sector, size, and structure and regardless of the occupational groups and employment levels involved; (2) in the seven case study organizations, ROI from training ranged from 30% to 7,000%; (3) training programs can be evaluated effectively by using a simple four-step methodological framework consisting of collecting data, pretesting and posttesting, multivariate analysis, and calculation of ROI. (Forty-one tables/figures and 24 references are included along with biographical details about contact persons at the case study sites.) (MN)

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Executive summary

In this study, a training evaluation process is developed to assist organisations in identifying the financial returns from training investment decisions. This evaluation process uses a wide variety of statistical techniques dependent on the quantity and quality of the data available. The process enables the determination of the value to an organisation from various training projects.

There are three major objectives driving this report. The first objective is to present detailed examples or case studies of actual training programs undertaken by Australian organisations and to illustrate how training programs can be evaluated, what data are necessary for evaluation and what techniques can be applied as part of the evaluation process.

The second objective is to quantify the net gains derived from training programs. This includes identifying the costs and benefits associated with training and determining the net financial impact of the training. While training programs often generate benefits beyond financial considerations, an organisation's stakeholders frequently need to know what the impact of training is on the 'bottom line'.

The third objective of this report is to develop a simple and practical process for training evaluation. Such a process should be general enough for use by most, if not all, organisations, whether they are profit, non-profit, private or government-owned.

An important feature of the case study organisations in this report is that their organisation profiles vary. For example, QR (Queensland Rail) is a government-owned transportation company, while Australia–New Zealand Direct Line is a privately owned company. Mission Australia is an important non-government charitable organisation. Target is part of the Coles-Myer group, which is a publicly listed corporation. Kodak and Franklin's are Australian subsidiaries of large multinational corporations. The aim of investigating such a diverse group of organisations is to emphasise the point that training has a role to play in all organisations, and that significant returns from training are not dependent on industry, ownership structure and nature of business operations. Significant returns can be derived when training is well designed, expertly delivered, when the transfer and acquisition of skills and knowledge is facilitated, and when organisations employ the new skills and knowledge productively.

Given the diversity of the case study organisations, it is *not* possible to compare the organisations, and specifically it is not possible to compare their rates of return because the training programs are so diverse. There is no benchmarking undertaken in this report.

The two main forms of data used are time series and matched pairs, pre- and post-training. In addition, both subjective and objective data are used in a number of the case studies, illustrating the diversity of data sources available to organisations and the use to which such data can be put. The evaluation process covers a range of projects and a range of trainees, from operators to managers.

The main findings arising from our analysis of the evaluation of various training programs for our case study organisations are as follows:

First, the financial and other returns from a well-designed training program are substantial. For commercial-in-confidence reasons, the evaluation results for the various training programs are presented in the form of percentage or level changes but represent substantial dollar returns. The return on investment (ROI) from training ranged from 30 per cent to 7000 per cent.

Second, even though the estimated ROI varies substantially from training program to training program, there is a remarkable consistency in the positive ROI achieved by these programs. The training programs involve a range of occupational groups and employment levels.

Whether training involves new inductees or senior managers of companies, significant financial returns can be generated through training. All of the case study organisations received a positive ROI on their training program. Some rates of return are very large, indicating the possibilities open to organisations. However, the respective rates of return are not comparable as the firms are not operating in the same industry or different training programs are being evaluated.

Third, a simple four-step methodological framework, in which evaluation is best carried out, is presented and consists of collecting data, pre- and post-testing, multivariate analysis and calculating the ROI.

Fourth, a number of quantitative techniques are readily available (some of which are presented) for evaluating training programs. These techniques vary in complexity but are generally easily accessible through computer packages.

Fifth, the choice of technique depends on the quantity and quality of the data. This equally is applicable to both qualitative or quantitative analysis.

This study has shown that a well-designed and -delivered training program can be expected to generate significant financial returns that compare quite favourably with other forms of investment.

Introduction

Individuals, firms and entire economies stand to reap substantial financial as well as non-financial returns from well-designed and -delivered training programs. Significant effort has been devoted to enhancing the training profile of Australian industry, ensuring that the desired competencies are attained, that skill levels are increased and that a learning culture is cultivated. Several reports have stressed this need for an expansion in workplace skills (see for example Dawkins 1988, 1989; Keating 1992; OECD 1997).

The evaluation of training programs has been in the spotlight in recent years, both in Australia and overseas. The aim of this report is to present a body of evidence indicative of the types of financial benefits Australian firms have received from training. The selection of the appropriate training program and the quantification of the benefits from such programs are a crucial input into the decision-making processes of successful enterprises. Investment in training by enterprises is important if Australian firms are to achieve the status of high-performance enterprises. The case studies all involve real organisations, with real training programs which incurred costs and from which benefits have been derived. An evaluation model is developed in the report and is applied to all of the case study organisations and is designed to be general enough for use by other organisations. A practical, flexible and cost-effective process for training evaluation is also presented. On the basis of the case studies, it can be concluded that significant returns from training can be expected and these are independent of industries, ownership, structure and nature of the business operations. Significant returns accrue from training when it is well designed, expertly delivered and when organisations employ these new skills and knowledge productively.

Aims and scope of study

The present study develops and tests an evaluation instrument for use by enterprises to assist them to evaluate (both financially and non-financially) their training investment decisions. This evaluation instrument uses a wide variety of statistical techniques dependent on the quantity and quality of the data available. The instrument enables us to determine the value to the organisation of various training projects.

With the exception of a handful of studies, there is a dearth of Australian empirical analysis of training. It is for this reason that a number of bodies, such as the Australian National Training Authority (ANTA), the Office of Training and Further Education (OTFE) and the National Centre for Vocational Research (NCVER) have commissioned research into this area. The present report is a significant extension of an earlier study commissioned by the OTFE, *Return on training investment* (OTFE 1997).

There are three major objectives driving this report. The first objective is to present detailed examples or case studies of actual training programs in Australian industry. Understandably, the organisations that make up these case studies were very sensitive about their data as well as about their training programs. They operate in competitive markets so that the amount of information we have included in this study has taken this factor into account. Nevertheless, these examples illustrate the types of training undertaken by Australian organisations and illustrate how training programs can be evaluated, what data are necessary for evaluation and what techniques can be applied as part of the evaluation process.

The second objective is to quantify the net gains derived from training programs. This includes identifying the costs and benefits associated with training and determining the net financial impact of the training. While training programs often generate benefits beyond financial considerations, an organisation's stakeholders frequently need to know what the impact of training is on the 'bottom line'.

The third objective of this report is to develop a simple and practical model of training evaluation. Such a model should be general enough for use by most, if not all, organisations.

During the preparation of this report, a number of organisations were consulted, including American Express, Telstra Corporation, Simplot, Kelloggs, Hamilton Island, Jupiters Casino and Westgate Transport. Discussions with these organisations assisted with the development of the training evaluation methodology adopted in this report. Seven organisations participated as case study organisations. The seven organisations, together with their principal economic activity and employment size are listed in alphabetical order in table 1.1.

Table 1.1: Case study organisations, industry grouping and employment

Case study organisation	Industry	Employment
Australia–New Zealand Direct Line	Transportation (freight)	300
Franklin's	Retail	27 900
Huntsman Chemical Company	Manufacturing	400
Kodak Australasia	Manufacturing	2 000
Mission Australia	Charity	2 200
QR (Queensland Rail)	Transportation (rail)	14 800
Target Australia	Retail	23 000

The case study organisations cover a significant breadth of Australian industry, and collectively employ over 70 000 people.[1] Using the number of employees as an indicator of size, it is evident that the case study organisations are relatively large and have access to greater levels of resources than do smaller organisations. However, the training evaluation methodology employed in this report is flexible enough to be used by smaller organisations. We return to this issue of the size of organisations in the final chapter of this report.

An important feature of the case study organisations is that their organisation profiles vary. For example, QR is a government-owned transportation company, while Australia–New Zealand Direct Line is a privately owned company. Mission Australia is an important non-government charitable organisation. Target is part of the Coles-Myer group, which is a publicly listed corporation. Kodak and Franklin's are Australian subsidiaries of large multinational corporations. The aim of investigating such a diverse group of organisations is to emphasise the point that training has a role to play in all organisations and that significant returns from training are not dependent on industry, ownership structure and nature of business operations. Significant returns can be derived when training is well-designed, expertly delivered. when the transfer and acquisition of skills and knowledge is facilitated, and when organisations employ the new skills and knowledge productively.

Given the diversity of the case study organisations, it is *not* possible to compare the organisations, and specifically it is not possible to compare their rates of return because the training programs are so diverse. There is no benchmarking undertaken in this report. In table 1.2, we present a list of the organisations, together with the principal benefits derived and the estimated return on investment (ROI) associated with each case study. Table 1.2 summarises the results presented in the detailed sections on the case study organisations.

[1] The employment figures relate to the division's employment and not to the parent organisation, for which employment levels are significantly higher.

Table 1.2: Case study organisations, impact of training and return on investment

Case study organisation	Positive impact of training on:	Estimated return on investment
Australia–New Zealand Direct Line	Goal-setting, time management	323%
Franklin's	Costs of induction	1000%
Huntsman Chemical Company	Safety and WorkCover premiums	1277%
Kodak Australasia	Productivity	256%
Mission Australia	Staff turnover	7125%
QR	Fuel usage, draft and buff forces	30%
Target Australia	Sales and staff turnover	980%

It is necessary to protect the confidentiality of the data supplied by the case study organisations. Hence, there is no reference in this report to the actual value of costs and benefits associated with the training programs. Rather, the costs and benefits are expressed in net terms and as a percentage, although the total value of training costs and benefits are substantial.

It can be seen from table 1.2 that all of the case study organisations received a positive ROI on their training program, and that all of these are large. Some rates of return are very large indicating the possibilities open to organisations. The respective rates of return are not comparable as the firms are not operating in the same industry, or different training programs are being evaluated. They are presented as a summary rather than for comparison purposes. Also note that the ROIs are likely to be lower bound estimates as all the costs could be identified but not all the benefits. In addition, the range and timing of benefits varied from program to program, making comparison of rates of return not feasible. It should be noted also that a ROI of 50 per cent for a company may be of more economic and strategic importance than a ROI of 300 per cent for another company. The fact that ROI was positive and significant for all seven case studies does not mean that training will always have positive returns. Nor does it mean that all training programs for these organisations have generated positive returns. However, it does indicate that a well-designed and -delivered training program can be expected to generate significant returns and is likely to compare favourably with other forms of investment.

Table 1.3: Case study organisations, name of training program, trainee group and date used

Case study organisation	Training program	Trainees	Data used
Australia–New Zealand Direct Line	Effective Personal Leadership	Managers	Matched pairs, Pre- and post-training
Franklin's	Franklin's Induction Program	New employees	Time series
Huntsman Chemical Company	SafetyMate	Operators	Time series
Kodak Australasia	Advanced Spooler Operator Training	Operators	Time series
Mission Australia	Employment Relations Workshop	Managers	Panel data
Queensland Rail	Train Dynamics Concept Development	Train drivers	Matched pairs, Pre- and post-training
Target Australia	Life Styles Inventory	Store managers	Matched pairs, Pre- and post-training

Evaluation of training, by definition, relates to data relevant to that training initiative. Details for each program can be found in the text of this report. However, table 1.3 presents a

summary of the data used for each case study, the group trained and the name of the training program.

As can be seen from table 1.3, the two main forms of data used are time series and matched pairs, pre- and post-training. In addition, both subjective and objective data are used in a number of the case studies, illustrating the diversity of data sources available to organisations and the use to which such data can be put. The evaluation covers a range of projects and a range of trainees, from operators to managers.

Case study organisations: Lessons

The main points arising from our analysis of the evaluation of various training programs for our Case Study Organisations are as follows:

First, a simple four-step methodological framework in which evaluation is best carried out is presented. This framework consists of collecting data, pre- and post-testing, multivariate analysis and calculating the ROI.

Second, a number of quantitative techniques are readily available (some of which are presented) for evaluating training programs. These techniques vary in complexity but are generally easily accessible through computer packages.

Third, the choice of technique depends on the quantity and quality of the data. This is equally applicable to qualitative or quantitative analysis.

Fourth, the financial and other returns from a well-designed training program are substantial. For commercial-in-confidence reasons, the evaluation results for the various training programs are presented in the form of percentage or level changes but do represent substantial dollar returns.

Fifth, the training programs involve a range of occupational group and employment levels. Nevertheless, from new inductees up to senior managers of companies, even though the estimated ROI varies substantially from training program to training program, there is a remarkable consistency in the positive ROI achieved by these programs.

The case study organisations are divided into two groups reflecting the type of data that were available to analyse their training programs. The data for the first group of four: the Huntsman Chemical Company, Franklin's, Kodak Australasia and Mission Australia, were in a time series form, while that of the second group: QR, Target Australia and Australia–New Zealand Direct Line, were matched pairs data (data for the same individuals pre- and post-training).

Outline of report

The report is structured as follows. In the following section, the methodology is presented, followed by the seven case studies. The case studies are not of equal length. This is not because some case studies are more important than others; rather, this reflects the emphasis placed on certain points, specific to that case study. The focus of the final chapter is to draw inferences from the case studies and to discuss the usefulness and generalisation of the training methodology adopted in the report.

Training evaluation methodology

Training evaluation process

Training professionals frequently ask three key questions in relation to the evaluation process. What data do I need? What techniques should I use? Is there a simple approach to evaluating training? Answers to each of these questions are offered in this report. In particular, developing a practical and cost-effective process to evaluating training is one of the objectives of this report. Such a process should be flexible enough to be applied to most training programs, and should be independent of an organisation's size, ownership structure and industry. In this chapter the evaluation methodology for such a process is presented.

The approach adopted here is relatively simple and was found to be applicable to all of the organisations studied, and we are confident that it will be applicable to organisations in general. The methodology follows the methods outlined in *Return on training investment* (OTFE 1997), as well as Kirkpatrick's (1987) four levels of training evaluation. The menu of statistical tools and tests that can be applied to investigate the impact of training is very large. Some of these tools and tests are discussed in *Return on training investment*, and are not reproduced here. The reader is referred to that document.

Kirkpatrick developed a model of training evaluation which has served as the industry standard. Kirkpatrick's four levels of evaluation are:

- learner reactions to the training program at level 1
- evaluating the learning and acquisition of knowledge at level 2
- job application and changes in behaviour at level 3
- observable business results at level 4

Most organisations strive to evaluate at level 4, and this is the focus of evaluation undertaken for all of the seven case studies presented here.

In *Return on training investment*, the Kirkpatrick model was extended by introducing four stages of evaluation associated with six groups of evaluation techniques.

These four stages are:

- *budget*: the simplest form of evaluation, involving, for example, whether the training budget was spent
- *skills*: training is evaluated on the basis of functional and operational needs
- *project*: evaluation of the contributions of training to the overall project
- *strategic*: the highest form of evaluation, designed to achieve an optimal allocation of training resources across the entire organisation, as noted in *Return on training investment*:

> *The fact that the project itself can be related to Company X's strategy does not make Company X a strategic evaluator. Strategic evaluation requires that a direct and conscious link is established between strategic objectives and training objectives, and the way in which they will be measured, before planning for the actual training commences* (OTFE 1997, p.13).

The six sets of evaluation techniques are:

Evaluation technique A: budgeted targets

Evaluation technique B: subjective analysis after training

Evaluation technique C: competencies gained

Evaluation technique D: competencies applied

Evaluation technique E: quantitative analysis of training on organisational performance

Evaluation technique F: strategic evaluation

The four stages of evaluation introduced in OTFE (1997) differ from the Kirkpatrick model in that they incorporate both a budget evaluation and a strategic evaluation. Furthermore, OTFE (1997) introduces the six evaluation techniques to form a more encompassing evaluation methodology. In *Return on training investment* it was found that few organisations evaluated at the strategic level. During the preparation of the current report, a number of organisations were contacted and it was found that few organisations look beyond the project level.

Some of the evaluation techniques and stages in the OTFE report (1997) have not been applied to the organisations participating in this study. Moreover, we have presented limited analysis relating to Kirkpatrick's levels 1, 2 and 3. This is not to suggest that these are not useful. The results presented in this present report relate to evaluation techniques D, E and F, while the main focus is on business results. However, issues such as budget evaluation and subjective evaluation following training are very important. Indeed in some of the case studies we referred to 'happy sheets' in order to identify what the trainees thought of the training programs. Such information is valuable in identifying the responsiveness of the trainees to the mode of delivery, the trainer's clarity, the content etc. These are all important factors that moderate the extent to which skills, learning and knowledge have occurred. Likewise, evaluation for competencies gained are not reported here.

Four-step evaluation process

After consultation with a number of organisations, including the case study organisations, we found it useful to restate the Kirkpatrick and *Return on training investment* models into a four-step process. These four steps form the basis of the methodology adopted in this report. These four steps are illustrated in figure 2.1.

It is suggested that these four steps be followed sequentially. By undertaking first, pre- and post-training analysis, it can be determined if there was any change in the performance measure of interest. If, on the other hand, ROI was undertaken first, and a net financial gain is identified, it is not clear whether this is due to training or some other factor. Likewise, if a net loss was recorded, we want to know if this was due to training, or some other factor.

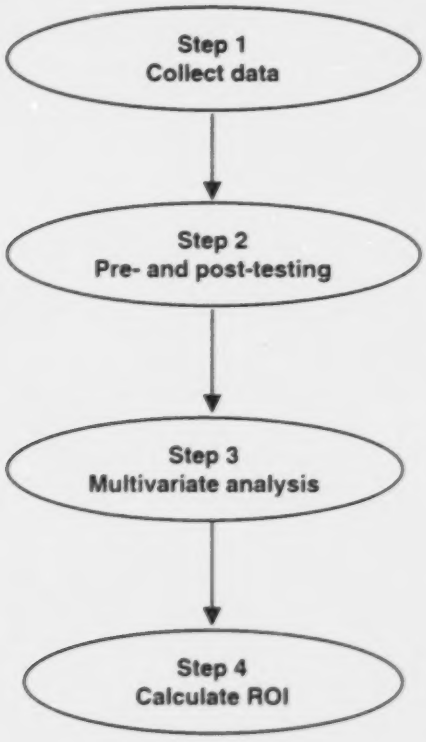
Step 1: Data collection

The obvious first step in the evaluation process is the collection of data. Without adequate data, evaluation is not possible. The data needed depends on the training program and especially the intended outcomes of the training.

Data are needed on the following four categories:

- a measure of performance
- a measure of training
- the costs of training
- the benefits arising from training

Figure 2.1: The four-step training evaluation process



For each of the seven case studies presented in this report, the data used are described, together with a table listing the associated costs and benefits. For most organisations the major difficulty in the data collection process will be the collection of benefits' data and the measurement of benefits. Where some of the appropriate data are not available, the evaluation process in necessarily restricted. The costs of training are usually well known and easily identified. This is not so for benefits. Often, it may be necessary to seek the co-operation of areas other than the training function within the organisation for data on benefits, and often, some of the benefits can not be quantified.

Step 2: Pre- and post-training

Once the data are collected, the next step in the evaluation process is to compare pre-training performance and/or behaviour to post-training performance/behaviour. Evaluation here involves investigation of the following:

- the direction of change in the target performance measure or behaviour
- the magnitude of the change
- the statistical significance of the change
- the economic significance of the change

Step 3: Multivariate analysis

At the multivariate analysis stage, evaluation involves exploring the extent to which interventions other than training contribute to changes in behaviour and performance. This is an important step as it helps to determine the extent to which training on its own has had an impact. This step is not always possible because the necessary data are unavailable. It is however highly recommended.

Step 4: Calculate ROI

The final step is a comparison of the costs of the training to the benefits derived from the training. This comparison is usually expressed as a cost–benefit ratio (CB) and return on investment (ROI). The analysis at this step can be undertaken at a single point in time or over a number of time periods. In the later case, this can involve net present value and discounted cash flow analysis.

The evaluation procedure adopted for the case studies presented in this report and advocated for other organisations thus involves collecting data, comparing the data pre- and post-training, using multivariate analysis to identify the contributions of training and finally determining the impact of training on the 'bottom line'.

Evaluating training using these four steps is a simple procedure, although not necessarily an easy one. Each of these steps is explored in some detail in the remainder of this section, with applications found in the following sections. Wherever possible, all four steps are recommended to derive plausible *estimates* of the impact of training. The impact of training is by necessity only an estimate. As noted by many researchers, it is rarely the case that conclusive proof will be found about any organisational intervention. Rather, analysts compile credible evidence about the impact of training. This evidence must satisfy a number of requirements. The data used must be of sufficient quality. The techniques applied must be scientifically valid, and the analysis should address the possibility that training may not be the only factor behind changes in performance.

Data collection

This is the most important and usually the most difficult step in the evaluation process. Without accurate and adequate data, it is not possible to make a plausible evaluation of training. As noted above there are four basic sets of data needed to evaluate training.

A measure of performance

Probably the most important data relate to a measure of performance. This is a measure of what training is supposed to impact upon. There is a very large list of performance measures available. The following is a list of the measures used in this report:

- fuel usage
- time taken to drive train
- train handling
- spool productivity
- staff turnover
- sales
- agency costs
- productivity

There are of course numerous other measures of performance and organisational objectives, including customer satisfaction, research and development, product quality, enhanced competitiveness, absenteeism and labour relations. Some measure of performance is always available.

A measure of the training

In order to undertake multivariate analysis, it is essential that some measure of training is constructed or calculated. There are a number of approaches to this, and several were adopted for the case study organisations. These range from direct measures of training such as actual dollar outlays on training to proxy measures of training, such as the use of dummy variables.

Dummy variable: a dummy variable is an artificial variable constructed to capture non-measurable characteristics and the impact of a particular factor for which data are not available. Typically, a dummy variable takes on values of 0 and 1. For example, a zero can be denoted for periods without the training and a 1 for periods with the training. The dummy variable can then be used in subsequent analysis to identify the impact of training. Dummy variables were used to capture the impact of training for three of the case study organisations—the Huntsman Chemical Company, Kodak Australia and Mission Australia. Dummy variables can be used in many types of quantitative analysis, but they are especially suited for time series analysis. Further information on dummy variables can be found in many statistics and econometrics texts (see for example, Gujarati 1995).

Actual expenditure on training: the actual dollar value spent on training is a readily available measure. For example, data on actual expenditures on training can also be used to represent the influence of training. This was used in the Huntsman Chemical Company case.

Measured behavioural change: in the case of Target Australia, trainees were rated in terms of their behavioural characteristics. Changes in these ratings can be used as an indicator of training effectiveness.

Costs of training

These data are needed in order to evaluate the impact of training on the 'bottom line'. The following are the costs for which data was collected for this report. All were expressed as dollar values. These cost items are the main cost items and will be familiar to training professionals. They are listed under direct and indirect costs below:

Direct costs

- production and supply of training and learning materials
- facilitation time
- travel costs
- accommodation costs
- costs of training equipment: simulators, personal computers
- computer software
- training delivery costs
- trainee wages and salaries

Indirect costs

- opportunity costs of time
- foregone output

Benefits arising from training

Organisations finance training because they expect benefits to flow from it. Some of these benefits may be difficult to quantify, while others will be relatively easy. The following is a list of the benefits for which data were collected in the process of evaluating the case study organisations. All of these were expressed as dollar values:

- additional sales revenue
- improved productivity
- reduced costs
- reduction in training expenditures
- reduced staff turnover
- improved safety record

- reduced WorkCover premiums
- reduced equipment downtime and reduced maintenance costs
- reduced fuel usage
- reduced rolling stock damage
- reduced stock shrinkage

Types of data

The data for the measure of performance and training, benefits and costs, can be collected over time, or at a point in time. In the first section of this report it was noted that the data used in this report are either in the form of time series, or matched pairs. Time series data are those collected over a number of time periods. For example, for the Huntsman Chemical Company case study, data were collected on the incidence of accidents on a monthly basis, over a number of years.

Data on matched pairs are those collected for either the same individual, the same group of individuals or the same workplace, both pre-training and post-training. For example, for Australia–New Zealand Direct Line (ANZDL), data were collected on goal attainment pre- and post-training for the *same* group of managers. For Target, data were collected on the behaviour of the same group of store managers, both pre- and post-training, and these were matched with store sales pre- and post-training.

Performance data can be collected for individuals, the division in which these individuals work, or for the organisation as a whole. In most cases, aggregate data are more readily available than are individual data. Moreover, access to aggregate data is easier than individual data. Data on the performance of individuals are preferable in identifying directly the impact of training on individual performance. However, the use of aggregate data can be justified on the grounds that performance improvements instigated by individuals should be revealed in aggregate production data. That is, even if it is not possible to use performance data associated with individuals, we can still test whether the activity of individuals has led to aggregate change. The major limitation with such an approach is that it may be that the performance of the trainees has improved, while that of the non-trainees has not. Trainee productivity may be influenced adversely by the activities of the non-trainees. Alternatively, the improvement in trainee performance may be offset by deterioration in performance of non-trainees or the improvement in the trainees performance may induce an improvement in performance by the non-trainees.

In practice this issue of performance data is resolved by the practical consideration of access to data. In most cases, it is only aggregate data that are readily available. However, since in most cases, the aim of evaluation is to determine the impact of training on bottom line results, the use of aggregate data can be justified. Disaggregate data are used in the Target, ANZDL and QR case studies.

Pre- and post-training analysis

Pre- and post-training analysis is used to compare a measured outcome before a training initiative to a measured outcome after a training initiative. This is the first step in our empirical investigation, once data are collected. At a minimum, training evaluation involves pre- and post-training analysis. It may not always be possible to use multivariate analysis and ROI, steps 3 and 4 respectively. However, pre- and post-training analysis can always be undertaken as the minimum level of evaluation.

The most common approach to pre- and post-training evaluation is a comparison of the average value of a performance variable, although the total value of a performance variable can also be used. For example, if sales were on average X in the pre-training period and are, on average, X+10 per cent in the post-training period, the conclusion is that sales are 10 per cent, on average, higher in the post-training period. Once the change in performance is

identified, the next step is to explore whether the change is *statistically significant* and whether the change is of *economic significance*. Statistical significance indicates the degree to which a change in performance is due to chance, or whether it can be concluded that the change is real. The usual benchmarks are the 10 per cent, 5 per cent and 1 per cent levels of statistical significance. However, simply stating that a change is statistically significant does not by itself mean that the change is of economic significance. Performance may change and that change may be statistically significant; however, the change may be so small that it is of no real consequence to the organisation. So, the magnitude of the change and the dollar values of the change in performance are important to the evaluation process. Organisations themselves need to make an assessment of the economic importance of any changes arising from training.

Both parametric and non-parametric tests can be used to test for statistical significance. Non-parametric tests are to be preferred when evaluating training, given that in most cases the exact distribution of the variables under investigation is not known. Non-parametric tests include the Mann-Whitney test and the Wilcoxon test. These can be performed on a number of standard statistical packages, including SPSS, S-Plus and Microsoft Excel. In the analysis presented in this report, both parametric and non-parametric tests were conducted, and in nearly all cases the results of either one or the other tests were not sensitive to the type of statistical significance test performed.

In addition to formal statistical tests, graphical representation of the data is a very valuable tool. In most of the case studies presented in this report, the key variables of interest are graphed in order to see visually what the statistical tests are picking up.

Multivariate analysis

Multivariate analysis denotes a set of techniques which considers the relationships among more than two variables—it involves multiple variables. Multiple regression analysis is used to explore the association between training and the dependent variable, as well as to isolate the impact of other variables on the dependent variable. This means that it is then possible to identify the separate impact of training on the dependent variable. Multivariate analysis is desirable as it helps to identify the extent to which factors other than training had an impact on the performance measure under investigation. This makes the evaluation process more credible, especially to areas of the organisation outside of the training function.

There are a number of multivariate techniques available, but the technique adopted in this report is multiple regression analysis. In most cases, multiple regression analysis is all that is needed. The idea behind multiple regression analysis is that the variable of interest (usually a measure of performance, as discussed above) is made the dependent variable and a set of explanatory variables is introduced (actually regressed onto the dependent variable) to capture the influence of relevant factors. The principal explanatory variable is training. This is where the measure of training discussed above becomes particularly handy.

In cases where the relevant variables can not be quantified, the multivariate analysis will be incomplete. In this report, multivariate analysis was undertaken for all but one case study. Details of the actual multiple regression analysis conducted can be found in the following sections.

Additional information on multiple regression analysis can be found in most statistics textbooks. There is a wide range of software for undertaking multiple regression analysis, from 'Microsoft Excel' to specialist software such as 'Econometric Views'.

It is important to undertake a number of diagnostic tests when using multiple regression analysis. These diagnostic tests offer information on the reliability of the estimated model. The tests include testing for autocorrelation, heteroscedasticity and mispecification. These tests were conducted on all of the multiple regressions reported for the case study organisations. The results reported in the sections on the case study organisations all come from models which have passed all of the relevant diagnostic tests. The diagnostic tests are not discussed here, but a good introduction can be found in Gujarati (1995).

A number of issues need to be considered when undertaking multivariate analysis and attributing performance changes to the effects of training.

Ignoring the impact of ability and education

Failing to account for the differences in natural ability of the trainees will lead to upward bias in the estimates of the impact of training. This arises because the impact of ability is ignored and its contributions to performance are attributed to training. Moreover, there is a cohort effect. The fact that a particular cohort or group of trainees responded well to the training program, transferred skills gained to the job and contributed to improvements in performance, does not guarantee that the next cohort will respond in a similar manner and have similar performance-enhancing effects. People differ in their motivation and abilities, a factor which needs to be considered.

Similarly, there is complementarity between education and training. It is likely that educated people are generally easier to train and hence training occurs at lower costs. Educated people may be also able to absorb training in a shorter period of time. In practice, it is rarely possible to control for factors such as ability, experience and prior education. Such detailed data are often not available, and were not included in this report.

Training transfer

The relevance and quality of the training, and the extent to which skills learned had a chance to be applied, are important moderating factors in the degree to which training impacts on performance. Mitchell (1994, p.202) notes that:

> *... a cost-benefit model alone cannot measure and assess the value of training. Many phenomena connected with training and organisations can leave even the highest-quality training disconnected from the planned outcomes. ... There is no doubt that gains accomplished through training had no real chance of success under the conditions of enormous change. Cutbacks occurred during a crucial portion of the evaluation, blurring the behavioural and organisational results. ... A heavy reliance on cost-benefit analysis or measurement of cost savings would not be able to highlight uncontrollable organisational events. In some cases, patience and belief are essential.*

Rather than adopting Mitchell's last recommendation, but mindful of his warnings, it is necessary to consider the organisational climate into which training is introduced. Specifically, the following factors must either be incorporated into the empirical investigation, or must be considered when inferences are drawn from the data:

- the influence of organisational events on the impact of training on performance
- the extent to which the trainees had an opportunity to apply the acquired skills
- the existence of any organisational barriers to training transfer, such as the degree to which managers were committed and supervisors were involved
- the quality of training provided. Kirkpatrick's level 1 evaluations can offer some insights here, as can the training providers and the organisations themselves

Bunching of interventions

The biggest challenge to researchers and training professionals is the issue of whether the individual effects of training can be isolated. This relates to the issue of the bunching of interventions. In most cases training is only one of the interventions introduced into the workplace. For example, training may be introduced at the same time as substantial organisational change, the introduction of new technology, other human resource management changes such as profit-sharing, as well as changes in product market competition and government regulation.

Importantly, there is no guarantee that the individual effects can be isolated even if the appropriate data are available. In reality, there may exist important *interactive effects* amongst

the various interventions. For example, it may be that training only has an impact on performance if it is introduced together (or bunched with) other interventions. In such cases, researchers may not be able to attribute to training a specific and individual contribution. However, they may be able to attribute performance-enhancing effects to a specific combination of interventions (see MacDuffie 1995). In the case studies presented here, this issue did not arise. Training was either the only intervention over the period studied, or the impact of most other factors could be isolated.

Cost–benefit analysis

The aim of cost–benefit analysis is to assign a dollar value to the costs and benefits associated with the training program. The net figure represents whether there is a net gain, or a net loss, at a point in time to the organisation. It is at this step that the data collected on costs and benefits are used (see the earlier discussion above).

In addition to calculating ROI, evaluation of the estimated ROI is also an important process. It is up to organisation themselves to consider whether the estimated ROI is adequate. This will usually involve an assessment of whether the:

- the appropriate type and quality training was delivered
- training targets were met
- training skills and knowledge were applied fully

In addition, the ROI from training versus the ROI from alternative strategies can be considered.

Unless all of the relevant benefits and costs of training are considered, the impact of training will not be measured properly. Thus, it is necessary to consider and measure, wherever it is practical do so, all of the associated costs and benefits.

The costs and benefits associated with training do not arise instantaneously. For example, training may have an immediate impact (a spike) on performance, and then performance may regress to where it was before. Alternatively, the impact of training may not be felt fully until some time in the future. Learning tends to depreciate and retraining may be required and hence additional costs are incurred. The distribution of benefits and costs of training over time needs to be incorporated into the empirical analysis. Failing to do so can lead to measurement errors. ROI can be extended by including the costs and benefits flowing over time, by conducting discounted cash flow and net present value analysis. The estimation of ROI over time is the most difficult to incorporate in the evaluation process, as it so often relies on judgement and is best dealt with by considering a number of scenarios.

It is important to note that by necessity the ROI is an estimate. The degree to which it is an estimate depends on the quality of the data on costs and in particular, benefits. The ROI presented for each of the case studies in this report are all estimates, and some involve a greater degree of estimation than others. For example, in some cases, only some of the basic benefits could be estimated, so that the ROI is to be regarded as a lower bound estimate only. This situation is likely to arise in general. For example, an individual organisation may be evaluating several of its own training programs. While in practice most of the costs will be identifiable quite readily, the ease with which it can estimate benefits will vary from program to program. This may mean that a single organisation will experience problems in comparing the ROI from different training programs, let alone comparing the ROI from training and other investments, not related to training.

Advanced techniques

Pre- and post-training analysis, multivariate analysis and ROI are all standard techniques in training evaluation. There are, however, other techniques which can be used. Two such

techniques are Granger causality and stochastic production frontiers and data envelopment analysis.

Granger causality analysis is applied to time series data and is used to determine whether one variable 'causes' another, rather than just being correlated. In most cases, regression analysis establishes association among variables, such as sales and training. However, this does not indicate that it is training which has contributed to sales. It may be that higher sales generate revenues which facilitate training; that is, the causation may run from sales to training. Granger causality analysis establishes the nature of the causation. This technique is applied to the Huntsman Chemical Company case study. Further information on Granger Causality analysis can be found in advanced econometrics textbooks (see Charemza & Deadman 1997).

The impact of training on performance can be investigated further by using more advanced econometric techniques. In particular, the use of cost and production functions and data envelopment analysis (DEA) and stochastic production frontiers have proved useful in exploring performance (see Morrison 1993 and Coelli et al. 1998). The primary aim of training is to alter the relationship between inputs and outputs. These techniques can be used to calculate technical efficiency, allocative efficiency and scale efficiency, as well as technical change and total factor productivity. These require a substantial body of data, and are not illustrated in this report.

Summary

It is important to understand what the methodological steps 2, 3 and 4 set out in figure 2.1 are designed to do. The pre- and post-training analysis undertaken at step 2 establishes the direction and magnitude of any change in performance. The multivariate analysis undertaken at step 3 establishes whether a plausible link can be maintained between training and the change in performance. Cost–benefit analysis identifies the financial impact of the change in performance resulting from the training. Thus, using all four steps means that it is possible to estimate the financial impact of training (through the cost–benefit analysis), as well as whether that financial impact can be associated with the training (through the pre- and post-training and multivariate analysis).

Table 2.1 summarises the organisations evaluated in this report, together with the steps applied to them.

Table 2.1: Case study organisations

Case study organisation	Data	Pre- and post-training data	Multivariate analysis	ROI
Australia–New Zealand Direct Line	Matched pairs	YES	Not undertaken	YES
Franklin's	Time series	Not applicable	Not undertaken	YES
Huntsman Chemical Company	Time series	YES	YES	YES
Kodak Australasia	Time series	YES	YES	YES
Mission Australia	Time series	YES	YES	YES
QR	Matched pairs	YES	YES	YES
Target Australia	Matched pairs	YES	YES	YES

Training evaluation with time series data

In this chapter four case study organisations are presented, all four using the technique of time series data. The four case study organisations are:

- Huntsman Chemical Company
- Kodak Australasia
- Mission Australia
- Franklin's

Two of these case study organisations are involved with manufacturing (the Huntsman Chemical Company and Kodak Australasia); one is a well known retailer (Franklin's) and the other, Mission Australia, is a leading non-government charitable organisation.

Time series data are data collected over a number of time periods. In the case of the Huntsman Chemical Company and Mission Australia the data collection frequency is monthly and quarterly respectively. For Kodak Australasia it is weekly, while for Franklin's annual data are analysed. These are the usual data frequencies encountered in training evaluation, although the data could be collected daily.

Following the four steps outlined in the previous chapter, the starting point was the collection of the necessary data. These data were collected by the organisations themselves and were sourced from human resource databases, accounting records, and production records. This step is necessary for any evaluation and was hence undertaken for all four case studies.

The second step of pre- and post-training analysis is undertaken in the case of the Huntsman Chemical Company, Kodak Australasia and for Mission Australia. Multivariate analysis is applied to the Huntsman Chemical Company, Kodak and Mission Australia case studies, and ROI is applied to all four. This illustrates the flexibility of the four-step procedure—it may not be possible to proceed through all four steps, or the organisation or the evaluator may not be interested in some of the steps. However, at least some of the steps will always be possible or of interest to an organisation.

The case studies in brief:

- Occupational Health and Safety issues have gained prominence in recent years, and many organisations have devoted considerable resources to training employees in this area. The Huntsman Chemical Company is an excellent example of training in this area with substantial financial returns to the organisation from this investment.
- The costs of training often continue over several periods and the benefits from training also continue to flow over time. The Franklin's case study illustrates how these time dimensions can be incorporated into training evaluation. The case study involves an induction program which is the first port of entry of employees into an organisation's training process.
- The use of time series data allows a distinct separation to be made between the period prior to training and the period after training, and allows for valid statistical testing and inferences to be made regarding the two periods. In the case of Kodak Australasia, it is possible to identify three time periods: the pre-training, the period during training and the post-training period. The results show strong evidence of the positive impact of training on productivity.
- For Mission Australia we use a pooled data set. These are data collected for several cross-sections, in this case geographical regions, as well as over time. The trainees are managers and the focus of the training was to reduce staff turnover.

The format for each case study presented in this chapter, as well as in the next is to commence with an organisation profile, then a discussion on the training program, followed by a discussion on the evaluation methodology adopted, pre- and post-training analysis, multivariate analysis and finally to ROI.

Huntsman Chemical Company Australia Pty Ltd

Organisation profile

The Huntsman Chemical Company Australia was established in 1928 as a joint venture between Monsanto Limited and the Nicholas Company, which founded the Southern Cross Chemical Company. Over the years, expansion has occurred through acquisitions and joint ventures. Today, the company is a US-based multinational manufacturer of chemicals, plastics and resins, selling mainly to domestic markets and employing over 400 people. The major operating site is in West Footscray, which houses nine separate production facilities.

The Huntsman Chemical Company has adopted six corporate objectives, known as critical success factors. These are:

- health and safety
- environment
- customer satisfaction
- financial success
- our people
- optimize production

As part of their strategic planning process, the Huntsman Chemical Company has developed several key performance indicators. One of these relates to safety and is known as the medical treatment injury frequency rate (MTIFR). Health and safety are important to this organisation which has committed itself to improving safety through a combination of engineering procedures and behavioural change.

The training program

In 1998, two safety training programs were implemented. Leading in safety focussed on the role of leaders and SafetyMate focussed on individual behaviour. Trainees in SafetyMate were selected from people who were most at risk. Both programs were designed to improve workplace safety performance. About 82 per cent (or 275) of the relevant employees were trained, including almost 90 per cent from production, 89 per cent from utilities, and 73 per cent from maintenance and support sections. Training was compulsory but not all targetted employees could attend.

The training program targetted individual actions and behaviour to demonstrate how they contribute to accidents in the workplace. Twenty sessions of the program were delivered in house. Each session lasted three hours. Topics covered included:

- company health and safety values
- creating a safe working environment
- incident analysis
- incidents are preventable
- strategies for incident prevention
- human behaviour and its role in incident causation
- the SafetyMate process, how it works, some dos and don'ts
- plans for future use of the technique

The objectives of the training program were:

- to understand the influence of human behaviour on how people get injured
- to be able to observe work and make assessments of both safe and unsafe behaviour
- to be able to give feedback to reinforce positive behaviour and correct unsafe behaviour

Further details on the training programs can be found in Hancock (1998).

The organisation was interested in the impact of safety training on the incidence of workplace accidents. The expectation was that the training would reduce accidents in the workplace. The empirical investigation involved each of the four steps. First, data were collected on safety incidents. Second, the impact of training on safety was explored using statistical analysis in order to determine the magnitude and statistical significance of any change in accidents. This involved pre- and post-training analysis and multivariate analysis. Third, a cost–benefit analysis was undertaken to quantify the return from the training. The final step involved exploring the extent to which training contributed to strategic objectives. This is evaluation at the 'strategic' stage as outlined in OTFE (1997).

Step 1: Data collection, Huntsman Chemical Company

The data used for this analysis were derived from the organisation and involved monthly data collection on the number of lost time injuries, medical treatment cases and first-aid cases, for the period January 1993 to February 1999. These three are distinct categories.

A brief history of the Huntsman Chemical Company's safety record is presented in table 3.1 in the form of indices. The percentage change over time can be seen more clearly, by converting actual cases into indices. Over the period studied, lost time injuries, medical treatment cases and the number of first-aid cases have all fallen.

- A 'lost time injury' is defined as a work injury leading to death or inability to work for at least one full day or shift anytime after the day or shift in which the injury occurred.
- A 'medical treatment case' is a work injury requiring treatment by a medical practitioner and which is beyond the scope of normal first-aid including initial treatment given for more serious injuries.
- 'First-aid' cases involve a work injury not requiring treatment by a medical practitioner and which is clearly within the scope of normal first aid.

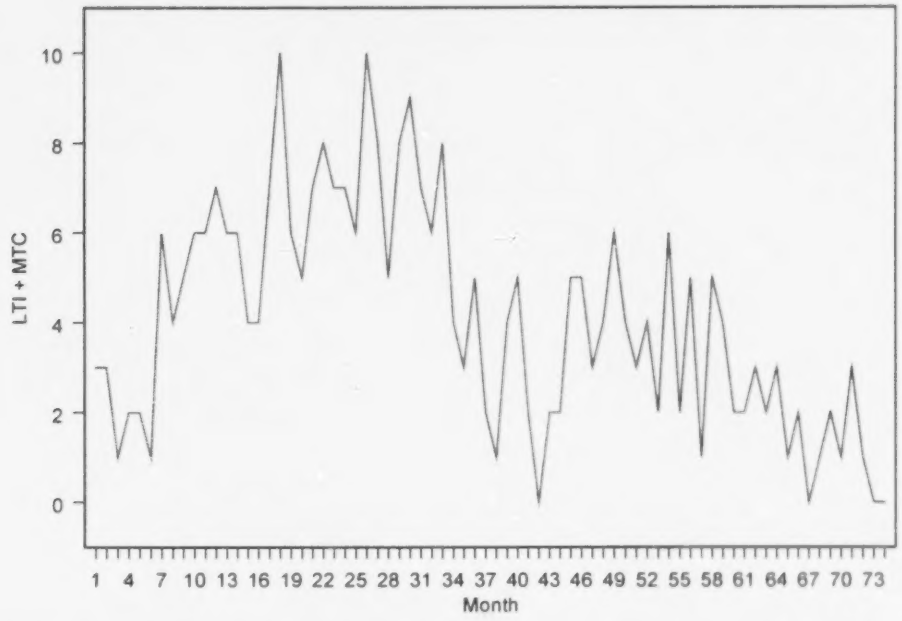
Table 3.1: Huntsman Chemical Company, indices of lost time history, medical treatment and first-aid cases, (1995 Base = 100)

Year	Lost time injuries	Medical treatment cases	First-aid
1995	100	100	100
1996	71	34	90
1997	57	62	62
1998	38	22	49

Source: Company records

Figure 3.1 traces the fluctuations in total lost time injuries (LTI) plus medical treatment cases (MTC) over the 1993 to 1999 period; the number of injuries and medical treatment cases per month is listed on the vertical axis. These peaked in the 1994–95 period, with a particularly noticeable reduction in the level in 1998 and continuing into early 1999.

Figure 3.1: Huntsman Chemical Company,
Total Lost Time Injuries and Medical Treatment Cases, 1993-1999



Step 2: Pre- and post-training analysis, Huntsman Chemical Company

A pre- and post-training analysis was undertaken prior to multiple regression analysis and ROI calculations. Table 3.2 compares the average monthly incidents before and after training. For example, the number of lost time injuries before training was, on average, 1.65 per month. After training, this had fallen to 0.55, on average, per month. Statistical analysis, using both parametric and non-parametric techniques, indicates that the reductions in accidents reported in table 3.2 is statistically significant at the 1 per cent level. Hence, the conclusion drawn is that this change is not due to chance. Table 3.2 reinforces the picture reflected in table 3.1. These reductions are significant from a business perspective, as they suggest improved safety performance and a safer workplace. Importantly, the organisation regards these changes to be of economic significance.

Table 3.2: Huntsman Chemical Company, pre- and post-safety training analysis

Variable	Before training	After training	Outcome
Lost time injuries	1.65 per month	0.55 per month	Statistically significant reduction
Medical treatment cases	2.92 per month	0.73 per month	Statistically significant reduction
LTI and MTC	4.23 per month	1.27 per month	Statistically significant reduction
First-aid	11.03 per month	6.36 per month	Statistically significant reduction

Step 3: Multivariate analysis, Huntsman Chemical Company

The main problem with pre- and post-training analysis is that it implies that all change in the variable of interest is a result of training. This limitation can be overcome, at least in part, by using multiple regression analysis. This allows tests to be conducted on the impact of training on safety, after controlling for other intervening factors in the workplace. Multiple regression analysis was undertaken using four different explanatory variables. The reason why these variables are included is so that the impact of training can be isolated from other factors which may impact on training. First, a dummy variable was included to capture the impact of training. This dummy variable took on the value of 0 for all the months prior to the introduction of the training and a value of 1 for the period after the training. The use of a

dummy variable offers a reliable way to investigate the impact of training when there are no alternative training measures available.

The second set of explanatory variables was the inclusion of seasonal dummies. Seasonal dummies are used to explore and capture variations in accidents over the course of the year. The incidence of accidents may fluctuate over the course of a year, independently of any training initiatives.

A third effect which must be incorporated is the existence of any time trends. For example, as workers gain more experience with new plant, equipment, products, processes and procedures, the incidence of accidents may fall. Moreover, broader community awareness of workplace safety can be expected to reduce the incidence of accidents in the workplace. Related to this is the autoregressive nature of many time series. That is, the present is often related to the past and the future is related often to what has happened in the past and what is happening in the present. Hence, if accidents are high in the past and present, this may affect the future incidence of accidents. Likewise, if accidents are low in the past and the present, this may influence the incidence of accidents in the future. Autoregressive effects can be captured by including as explanatory variables, lags in the dependent variable. This is the fourth set of explanatory variables.

It is important to separate these seasonal, autoregressive and time trend effects from the impact of training. The aim is to investigate whether training has had any impact on accidents, after controlling for these other effects. It is also important to note that over the course of 1998, the only occupational-health-and-safety-related interventions were the two safety training programs. Had there been other interventions, it would have been necessary to control for their impact on safety performance.

The regression methodology adopted was to commence with a 'general model' and to sequentially reduce this to a final 'reduced model'. That is, a model was first estimated with a number of autoregressive terms, all the seasonal dummies, the training dummy and the time trend. Statistically insignificant terms were deleted sequentially, until the remaining terms were all statistically significant at the 10 per cent level. This is known as the general-to-specific modeling strategy (see Hendry 1995). The final models were chosen only if they passed various statistical tests.[2] Only the final version of the estimated models is presented below. This procedure was adopted for all of the multivariate analyses presented in this report.

Table 3.3: Huntsman Chemical Company, multiple regression analysis (dependent variable is first-aid cases)

Variable	Coefficient
Constant	16.91***
Safety training	-3.63***
August	6.13***
October	5.17***
Time trend	-0.15***
Adjusted R-squared	0.44
Durbin-Watson statistic	1.99
F-statistic	10.53***

Note: *** statistically significant at the 1 per cent level

In table 3.3, the dependent variable is the number of first-aid cases. First-aid cases appear to be higher in August and October. The number of first-aid cases had been falling before the safety training program was introduced. However, even after allowing for this trend in first-

[2] The final models are free from heteroscedasticity, autocorrelation and mispecification. Heteroscedasticity was measured using White's heteroscedasticity test; the Breusch-Godfrey test was used to test for autocorrelation, and Ramsey's RETEST was used to test for misspecification. See Gujarati (1995) for details of these tests.

aid cases to fall over time, there is strong evidence that the introduction of safety training did reduce the incidence of first-aid cases. The coefficient on the training variable is negative and is strongly statistically significant. A negative coefficient indicates that training reduced the number of first-aid cases.

The analysis relating to lost time injuries (LTI) is presented in table 3.4, where only the key variables of interest are listed. LTI was also falling over time due to factors other than training; this is captured by the coefficient on the time trend. However, safety training has had a clear positive impact on the monthly lost time injury rates, in that it has reduced them—the coefficient on training is negative and statistically significant.

Table 3.4: Huntsman Chemical Company, multiple regression analysis, (dependent variable is lost time injuries)

Variable	Coefficient
Constant	5.80***
Safety training	-0.88*
Time trend	-0.06***
Adjusted R-squared	0.35
Durbin-Watson statistic	2.18
F-statistic	3.15***

Note: *, *** statistically significant at the 10 per cent and 1 per cent levels, respectively.

Note: The March, September and November dummies were included, as were a number of lags of the dependent variable. For the sake of brevity, these are not included in the results above.

A similar analysis for medical treatment cases indicated no statistically significant impact from training, for the period studied. This may be due to the nature of the data. Over time, as additional information is made available, a clearer picture should emerge as to the impact of training on medical treatment cases. However, it is clear that the introduction of safety training has had a positive impact on safety performance.

Step 4: Return on training investment, Huntsman Chemical Company

In the previous section a case was made that the training had exerted a positive impact on safety performance by reducing the incidence of workplace injuries. The logical extension to this is to inquire if this impact is of economic significance. The costs and benefits associated with the training program are presented in table 3.5. The financial benefits from the training can be measured as reduction in workers' compensation premiums. The relevant data are presented in table 3.6, in the form of indices and percentage change, with 1996–97 chosen as the base year. The actual data are confidential and hence are not presented here.

Table 3.5: Huntsman Chemical Company, costs and benefits of safety training

Costs	Benefits
Consultants' costs	Reduction in WorkCover premiums
	Improved safety

Because of the nature of Victorian WorkCover premiums, any reduction in injury rates and hence reduction in WorkCover premiums will occur with a lag. In 1997–98, premiums fell by 5.5 per cent. This period included the training period and a couple of months after the training period. In the following year, premiums fell marginally. The real benefit of the training program can be seen for the premiums in 1999–2000, with premiums likely to fall in the order of 37 per cent. (Organisations are notified about the likely premium for the year ahead.) This is a very significant reduction in costs, and reflects the gains accruing from the training program.

The rate of return from the training program was negative in the first year after the training program, because the reduction in premium was more than offset by the cost of the training program. However, the return on investment increases to about 1277 per cent in total by the second year! This reflects the lagged response of premium levels to changes in the pattern of injuries. The cost reduction was actually almost 13 times higher than the cost of the training program, which translates into 1277 per cent ROI. That is, each dollar spent on training returned about $12.77. The ROI on this training represents a highly attractive and very healthy return on funds spent on training to improve safety.

Table 3.6: Huntsman Chemical Company, rate of return to safety training investment

Year	WorkCover premiums (Base 1996–97 = 100)	Reduction in premiums	Return on training investment
1996–97	100.0		
1997–98	94.5	-5.5%	
1998–99	94.4p	-0.1%	-95%
1999–2000	59.9p	-36.6%	1277%

Note: p = preliminary

Note that these are returns to the organisation, and hence represent the private rate of return to the organisation from its investment. The social rate of return will be higher, because the reduction in injuries translates into benefits for the workers involved. These returns are not captured in table 3.6. Hence, the return on training investment presented in table 3.6 should be seen as a *lower* bound estimate of the *total* rate of return on training.

Note also that for this case study, there is no need for additional calculations to be made for lost production as no production or production time was lost. Operators came in on their day off but this time was covered by a prepaid training allowance. Each production operator has a bank of prepaid training hours which they draw on when attending off-the-job training. Some plants also allow a few members to leave the job for a few hours and their work is covered by other staff members.

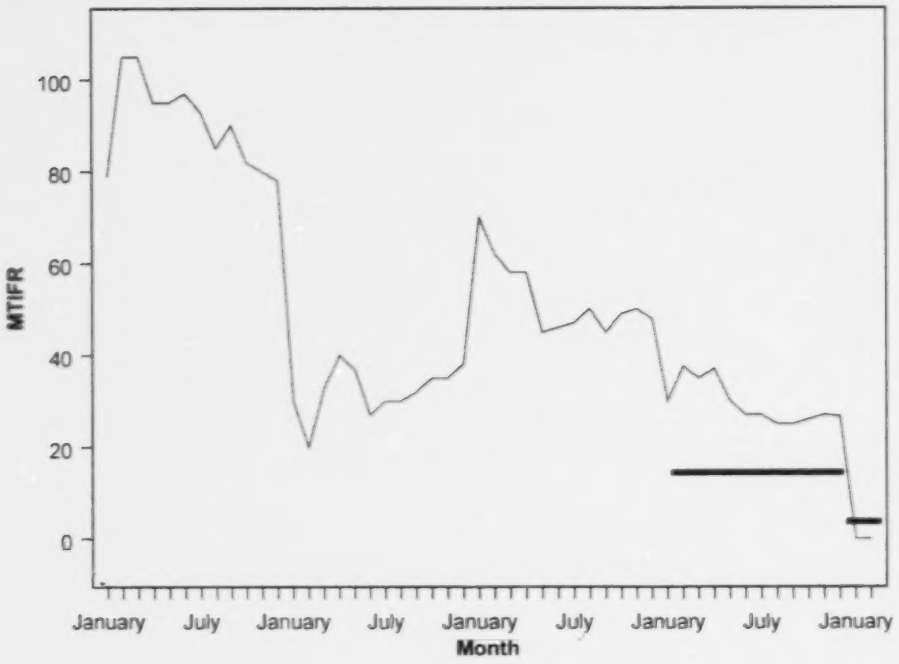
The ROI calculations shown in table 3.6 show that the reduction in WorkCover premiums over a two-year period has more than offset the costs of the training program. However, because the cost and benefits are likely to flow over a period of time, it is important to compare the value of costs and benefits at a single point in time. This is achieved by calculating net present value. Net present values were calculated assuming a real discount rate of four per cent. This discount rate is the current standard rate used in cost–benefit analysis. The benefits of the training are likely to flow for several years. However, simply taking a two-year period, it is clear that the net present value for the training investment was positive. A positive net present value means that the value of the benefits from training—in terms of present values—exceeds the cost of the training program. When net present value is positive, then the investment can be considered to have been worthwhile. An additional consideration is whether the training investment was the best investment, out of a range of possible investment alternatives. The actual net present value on safety training cannot be disclosed but it was a six-digit figure! While a comparison with other investments has not been undertaken, the net present value on this training is likely to be very competitive.

Strategic evaluation, Huntsman Chemical Company

It is clear from the above analysis, that safety improvements can be attributed to the training program and that a positive ROI was derived from the training program. The training investment was a success, as far as an individual project is concerned. An important issue is whether this has contributed to strategic objectives. That is, has the training been a success when evaluated at the strategic level?

The relevant measure of the impact of safety training from a strategic evaluation point of view is the medical treatment injury frequency rate (MTIFR). This is calculated as the number of lost time injuries and the number of medical treatment cases per 1 000 000 man hours. The time series graph of this rate is presented in figure 3.2, for the 49 months up to February 1999. The strategic objective is presented as the two thick horizontal lines: one for 1998 and one for 1999. It can be seen that while the MTIFR has been falling over time, the strategic objective had not been attained in 1998. For 1999, the strategic objective is for an even lower MTIFR (hence the lower horizontal line in figure 3.2 for 1999). In the first two months of 1999 this objective had been attained, with the MTIFR being zero for both months. The strategic objective has been attained. Whether this strategic objective continues to be satisfied for the rest of 1999 and beyond, as a result of the training undertaken in 1998 is something only future analysis could reveal.

Figure 3.2: Huntsman Chemicals, Medical Treatment Injury Frequency Rate, 1995-1999

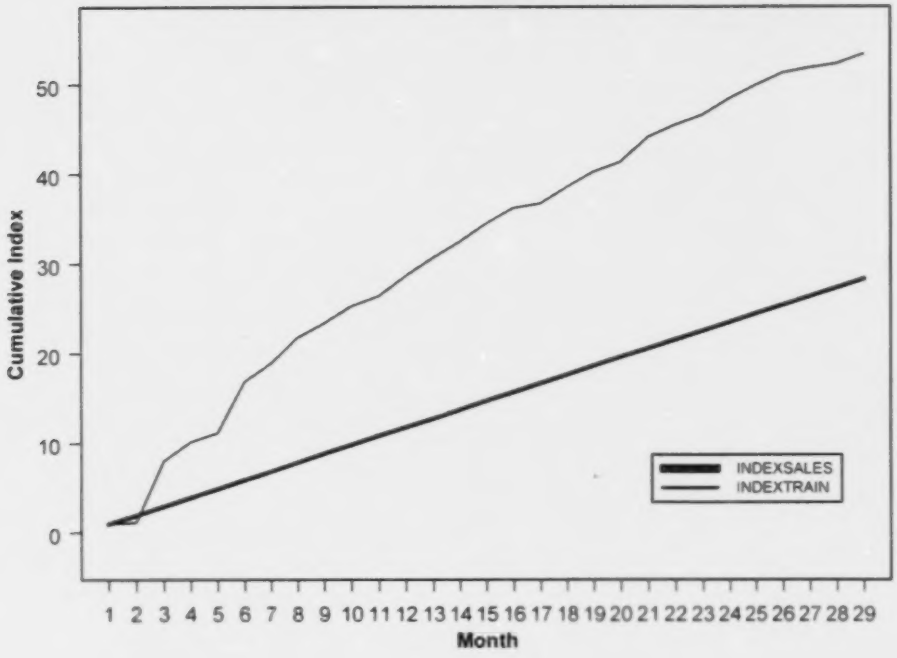


Impact of total training allocations, Huntsman Chemical Company

The preceding analysis has focussed on the returns to training in a particular training program, namely safety training. For the Huntsman Chemical Company case study we explore also the links between total expenditure on training and sales. Data were collected on monthly sales as well as on total expenditure on training, over a 29-month period, from January 1997 to June 1999. This was converted into a cumulative index series for each variable. The two series are illustrated in figure 3.3. It is clear from figure 3.3 that cumulative training has risen at a faster rate than sales, indicating the importance the company places on training.

The important issue is whether there is a link between training expenditure and sales performance. In order to explore this issue, Grangian causality analysis can be applied (see earlier section of the report for a discussion on this). The results are presented in table 3.7.

Figure 3.3: Huntsman Chemical Company, Cumulative Indices of Total Training Expenditure and Sales



There is solid evidence that training expenditure causes changes in sales, when 1 and 2 lags are used. This can be seen by the statistically significant F test. That is, training expenditure is a causal factor for sales growth. Sales increase as a result of training, one and two months after the training. There is also evidence of reverse causality with two lags. That is, sales growth causes changes in training expenditure with a two-month lag. The conclusion drawn is that sales and training cause each other. We can conclude that in the case of the Huntsman Chemical Company, training expenditure has a positive impact on sales performance.

Table 3.7: Huntsman Chemical Company, causality analysis for training expenditure and sales performance

Number of lags	Training causes sales	Sales causes training
1	YES, F = 11.01***	NO, F = 0.06
2	YES, F = 5.90***	YES, F = 7.75***

Note: *** statistically significant at the 1 per cent level.

Summary

For the Huntsman Chemical Company Australia, training had several benefits:

- It reduced injuries and increased workplace safety. This has obvious benefits to the Huntsman Chemical Company's workforce in terms of improved quality of working and leisure life.
- It improved the Huntsman Chemical Company's safety record. This is an important objective for the organisation. Importantly, safety is a key strategic objective. Evaluation at the strategic level shows that training did assist in satisfying this objective.

- It reduced WorkCover premiums paid by the company. Evaluation at the project level shows a high rate of return on the training investment.
- There is solid evidence that expenditure on ALL training activities contributes to total sales.

Kodak Australasia Pty Ltd

Organisation profile

Kodak Australasia is a manufacturer of a well-known range of photographic products including photographic paper. The organisation has received two Australian Quality Awards and the Australian Quality Prize. Kodak is a Registered Training Organisation, with all of its manufacturing departments certified to ISO-9000 Standard.

Kodak Australasia began as the Australian firm Baker and Rouse in the 1880s. In 1908, Baker and Rouse merged with Eastman Kodak Company to form the Kodak Australasia Pty Ltd. Kodak employs over 2000 people in Australia in its offices and facilities Australia wide. The bulk of the workforce is involved with the manufacturing and selling of photographic paper, film and other imaging products. Kodak Australasia has a modern distribution operation, with two-thirds of its manufactured output supplied to South-East Asian markets.

Kodak Australasia places a high value on quality of product and service, and is committed to long-term competitiveness through value and quality. Its commitment to quality is integrated with employee commitment, teamwork, communication, education and training.

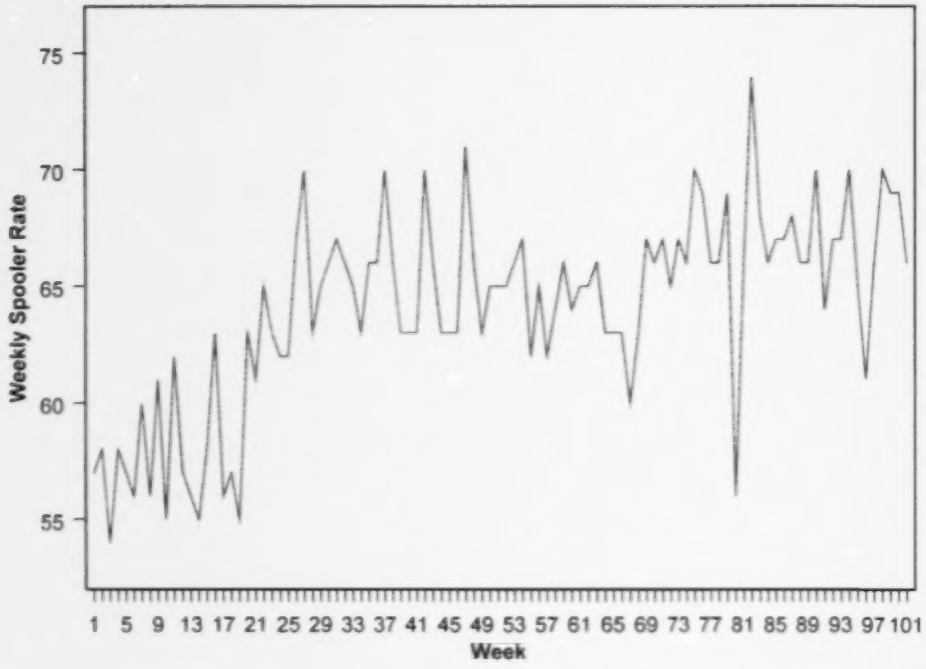
The training program

The training program is known as the Advanced Spooler Operator Training. This was delivered to 46 (or 90 per cent) of the spooling machine operators, in one department (the Roll Film Department). The aim of the program was to increase the capability of these operators to understand and fix machine problems. The expectation was that the training should reduce machine down-time and hence improve productivity. The on-the-job training was provided by members of the maintenance team. Groups of operators were trained sequentially for three days, with the entire training process completed over a two-month period. For full details, see Francis (1998).

Step 1: Data collection, Kodak Australasia

The evaluation of the training program involved investigating the changes in productivity as a result of the training. The data relate to weekly spooler rates (the assembly and packaging of 35 mm film), for the period from the first week of 1997 to week 45 of 1998. Figure 3.4 illustrates the fluctuations in productivity, as well as changes in the level of productivity over the period studied. The spooler rate is measured on the vertical axis and the week number is measured along the horizontal. It is clear that there is substantial variation in spooler rates from week to week.

Figure 3.4: Kodak Australasia, Weekly Spooler Rates



Step 2: Pre- and post-training analysis, Kodak Australasia

Since the training period spanned 9 weeks, it is interesting to compare spooler rates in the pre-training period, during the training period and after the training period. The average spooler rate for these three different periods is presented in table 3.9. It is clear that the average spooler rate rose during the training period and rose further in the post-training period. The spooler rate rose approximately 7 per cent during the training period compared to the pre-training period and a further 6 per cent after training compared to the training period. In total, productivity rose by almost 13 per cent in the post-training period compared to the pre-training period.

Table 3.8: Kodak Australasia, spooler rates

Variable	Pre-training	During training	Post-training
Spooler rate	58%	62%	66%

Table 3.9 presents the results of testing the differences in productivity for statistical significance over these three periods. Using both parametric and non-parametric tests, the conclusion is that productivity was statistically significantly higher in the period during the training period and in the period after the training. Importantly, the rise in spooler rate from 58 per cent to 66 per cent is of economic significance to the organisation.

Table 3.9: Kodak Australasia, inter-period comparisons of spooler rates

Comparison	Outcome
Pre-training compared to during training	Statistically significant higher rate during training period
Pre-training compared to post-training	Statistically significant higher rate post-training period
During training compared to post-training	Statistically significant higher rate post-training period

Note: All tests are statistically significant at the 1 per cent level.

Step 3: Multivariate analysis, Kodak Australasia

In order to explore further the links between productivity and training, multiple regression analysis was undertaken. In this analysis several control variables were introduced to separate, as far as possible, the influence of factors other than training on productivity. The dependent variable in this analysis is the weekly spooler rate (in percentage form). The primary variable of interest is the dummy variable on training; this was assigned a value of 0 for the period before the training and a value of 1 for the period during and after the training. Control variables include the gas problems which affected the Victorian economy during the period of study, the introduction of relieving on spooling machines (designed to ensure that machines do not stop during breaks), and the lifting of relieving for part of the period.

The results are presented in table 3.10 and indicate a solid, positive and statistically significant impact of training on spooling output.[3] Spooling output was rising over time, but the introduction of training has increased the spooling rate by 5.66 per cent, when all other factors are controlled for.

Table 3.10: Kodak Australasia, regression analysis of spooling output rate

Variable	Coefficient	
Constant	57.31	(68.21)***
Time trend	0.05	(3.71)***
Training	5.66	(3.88)***
Relieving on spooling machines	-0.40	(-0.26)
Relieving stopped	-1.36	(-1.19)
Gas problem	-0.11	(-0.05)
Adjusted R-squared	0.53	
Durbin Watson	1.75	
F-statistic	23.24***	

Note: *** statistically significant at the 1 per cent level

Step 4: Return on training investment, Kodak Australasia

The analysis above indicates strongly that the training program was associated with a statistically significant increase in productivity. Francis (1998) points out that the training program resulted in a significant reduction in call-outs. Over the period studied, the training generated an ROI of 256 per cent. That is, for each dollar of investment in the training process, the organisation received 2.56 dollars in return. This is likely to be a lower bound estimate, as the productivity improvements are expected to be sustained over time. The costs and benefits associated with the program are listed in table 3.11.

Table 3.11: Kodak Australasia, costs and benefits of advanced spooler operator training

Costs	Benefits
Labour	High productivity
Materials	Reduction in callouts
Consultants	

Summary

The training undertaken by Kodak Australasia had the targetted effect of increasing productivity and generating sizable financial returns to the organisation. Statistical analysis reveals that the productivity changes can be attributed, at least in part, to training.

[3] The regression model is free of autocorrelation, heteroscedasticity and misspecification.

Mission Australia

Organisation profile

Mission Australia is one of the largest non-government community service organisations in Australia and is ranked in the top 500 corporations in Australia. Mission Australia is a non-denominational Christian human services organisation with a budget of $85 million and 2200 staff providing over 400 services nationally. The organisation provides a diverse range of community services to disadvantaged people of all ages, is a major Job Network provider nationally and a New Enterprise Incentive Scheme (NEIS) Managing Agent in Victoria. The bulk of its funding comes from the government (70 per cent), with the remainder derived from donations, bequests, fees and rents.

Mission Australia came about as an incorporation of several missions: Sydney City Mission, Perth City Mission, Mission South Australia, Hunter Mission, Wagga Wagga City Mission, Wollongong City Mission and the various services throughout several States.

Its principal activities are to provide services such as accommodation and support for the homeless, family support, employment and training, youth services, aged care, counseling and chaplaincy.

Mission Australia has 10 key result areas:

- leadership and management
- Christian values
- planning
- quality of service
- national organisation
- advocacy
- income sustainability
- financial management
- communication
- human resource development

As part of the human resource development key result area, Mission Australia has implemented strategies to develop and support a strategic approach to training programs.

The training program

The training program evaluated here is known as the *employment relations workshops*. One of the aims of the workshops was to retain valued staff and to reduce staff turnover. The *employment relations workshops* are the initial phase of a broader training agenda and coincided with the launch of a personnel policies and procedures manual, and were directed at regions experiencing high levels of turnover or industrial activity. This comprised a two-day workshop that focussed on duty of care, sound recruitment and selection practices, EEO and other legislative compliance issues, and the importance of proper induction of new staff. It also looks at the tools available to monitor performance and sound disciplinary and termination procedures. A mixed delivery mode of role plays, case studies and scenario development was used and attendance was compulsory.

The trainees are 180 managers plus potential leaders, employed nationally. At the time of the analysis, eighty-four managers have already participated in the workshops held in Queensland, Western Australia, Northern New South Wales and Sydney. This two-day workshop was seen very much as a means to address a specific need.

Step 1: Data collection, Mission Australia

The evaluation presented here involves comparing staff turnover ratios before and after the training, across the four centers where training was introduced. The pre-training period data relate to the period June 1997 to March 1999. The post-training period relates to the period April 1999 to November 1999. However, to ensure comparability, the periods were matched. Data were derived from organisation records, on the number of employees at the start of the period, the number of new employees, the number of terminating employees, and the number of employees at the end of the period.

The variable of interest is the staff turnover ratio—the number of terminating staff to the number of employees. Some degree of termination will be optimal since both the organisation and the employees will find it advantageous to separate. For example, some staff may be due for retirement while others are no longer needed. However, what is of particular concern to any organisation is when these separations are sub-optimal. For example, the wrong person may have been recruited in the first instance. Since recruiting, separation and replacement are costly processes, organisations strive to minimise staff turnover. Data was not available on the proportion of terminations due to people retiring or whose services were no longer needed. Thus, the analysis here focusses on the turnover ratio derived from the total number of terminations. The turnover ratio is used rather than the absolute number of terminations, because as employment expands in size, terminations are likely to expand as well. Thus terminations are standardised by the level of employment.

Step 2: Pre- and post-training analysis, Mission Australia

Pre- and post-training analysis for Mission Australia takes the form of comparing staff turnover ratios in the pre-training period and the post-training period. These comparisons are presented for the four regions in table 3.12. The comparisons are made by taking the period post-training, and comparing it to a similar period pre-training. This involves a comparison ranging from six to nine months, depending on the region.[4] Any seasonal patterns will be reflected in both periods, so that the influence of this factor can be discounted.

The actual staff turnover ratios are not reported here, only the percentage changes. Queensland was the only region not to experience a decline in the staff turnover ratio. The slight increase in Queensland is not, however, statistically significant, so that we can conclude that there was no change in staff turnover ratio in this region. Staff turnover is lower across three of the four regions, and the difference is statistically significant, at the 5 per cent level.

Table 3.12: Mission Australia, change in staff turnover

Region	% change in staff turnover ratio
Queensland	+2%
Western Australia	-38%
Sydney	-69%
Northern New South Wales	-43%

Step 3: Multivariate analysis, Mission Australia

The multivariate analysis undertaken here is similar to that for the Huntsman Chemical Company, in that in addition to dummy variables, only autoregressive and time trends are considered. The dummy variables take the form of 0 for the pre-training period and 1 for the post-training period. The multivariate analysis was undertaken using what is known as a pooled time series approach. Pooled data are data collected both as cross-sections and time series. These are also known as panel data. The cross-sections here relate to data on Queensland, Western Australia, Sydney and Northern New South Wales. This is a different

[4] If a comparison is made with all of the pre-training data and the post-training data, the periods are not matched. The results in this instance show even greater improvement in the post-training period.

approach to that undertaken for the Huntsman Chemical Company where a single time series was available. Here we have four separate time series, covering the same time period, but relating to different geographical regions.

The aim of the multivariate analysis using pooled data is to identify whether training had an impact on turnover after controlling for autoregressive and time trend effects, by undertaking this analysis for all four regions at the same time, which is preferable to estimating separately for each geographical region.

From the pooled data multivariate analysis we can conclude that:

- There is a negative association between training and staff turnover for Northern New South Wales, but this was *not* statistically significant.
- There is a negative association between training and staff turnover for Queensland, but this was *not* statistically significant.
- There is a negative association between training and staff turnover for Sydney, and this was statistically significant, at the 5 per cent level. Specifically, the training program is associated with a staff turnover ratio that is 6.2 percentage points lower in the post-training period.
- There is a negative association between training and staff turnover for Western Australia, and this was statistically significant at the 10 per cent level. Specifically, the training program is associated with a staff turnover ratio that is 4.2 percentage lower in the post-training period.
- Autoregressive effects were particularly strong for Queensland.

The adjusted R-squared for this multivariate regression was 0.44. There are obviously other factors which have not been introduced into this analysis, because data are not available. The pooled data multivariate analysis offers strong evidence that the training reduced staff turnover ratios for two of the four regions where the training occurred. While the pre- and post-training analysis indicates that Northern New South Wales also experienced a decline in the staff turnover ratio, the multivariate analysis suggests that this decline cannot be attributed to training. During this period, Mission Australia underwent some restructuring which may have effected the staff turnover rate.

Step 4: Return on training investment, Mission Australia

The costs and benefits associated with the *employment relations workshops* are listed in table 3.13. The costs of the program include the usual costs of training. The benefits from training consist of savings from not having to recruit new staff in order to replace staff who have terminated, but whose services are still needed. Additional benefits arise when terminations are reduced, as productivity tends to be higher and there is less disruption to teams.

Staff from Mission Australia provided data on the total costs incurred, as well as making conservative estimates of the *total* benefits to the organisation from reducing unnecessary turnover.

Rather than attributing all of the reduction in staff turnover, and hence benefits, to training, the ROI was estimated by using the results from the multivariate pooled data regression. That is, the benefits from training are calculated by estimating the reduction in staff turnover which can be attributed to training, converting this into the number of employees who would have otherwise left from the organisation and then assigning a dollar value to this, from data supplied by the organisation.[5]

[5] While costs were included, no benefits were assigned to regions for which no statistically significant contribution from training was established.

Table 3.13: Mission Australia, costs and benefits of employment relations workshops

Costs	Benefits
Facilitator	Savings from recruitment - advertising - recruitment and selection process - induction and orientation - productivity lead time
Venue	Increase in productivity
Catering	Less disruption of teams
Accommodation	Lower costs associated with timing of exit
Materials	
Transport	

The cost–benefit (CB) ratio for this training was 7300 with an ROI of 7215 per cent. That is, for each dollar spent on training, a net gain of $72.15 was received. This is a very attractive rate of return on training investment. This figure represents savings in that, in the absence of training, costs would have been greater.

Summary

In this section, the evaluation of training programs for Mission Australia, undertaken in the four regions, is presented. In two regions there is strong evidence that the training programs yielded benefits to the organisations in the form of improved efficiency and reduced costs.

Franklin's

Organisation profile

Franklin's is Australia's largest discount supermarket chain, with stores in New South Wales, Victoria, Queensland and South Australia. Franklin's is also Australia's third-largest supermarket with 13.6 per cent of the national market, and 23.7 per cent of the market share in its home State, New South Wales.

Franklin's is owned by Dairy Farm, an international food retailing, manufacturing and wholesaling group with operations throughout Asia, the Pacific region, Australia and New Zealand. The Dairy Farm Group operates 1400 outlets comprising supermarkets, convenience stores and drugstores. In 1998, Dairy Farm reported worldwide sales of US$6.6 billion and employed around 74 000 staff. In Australia, Franklin's employs 27 900 people across 270 stores and is a major employer in the retail food industry (see Dairy Farm International Holdings Limited, 1998a, 1998b).

Franklin's stated mission is to be Australia's leading modern day discount supermarket. This involves:

- price consistently lower than competitors
- quality that meets customers' expectations
- neighbourhood range
- clean, safe and fast shopping

Dairy Farm has adopted three common strategic initiatives for all its businesses (including Franklin's):

- fresh products
- shopping environment and a shopping experience that is satisfying, efficient and pleasant
- efficiency and effectiveness, involving routine cost-cutting and value-adding

The company's vision is to be the leading food and drugstore retailer in the Asia-Pacific region. This involves:

- high-quality, low-cost products
- Asia-Pacific focus
- strategic alliances
- long-term shareholder value

The training program

The training program is known as the Franklin's Induction Program. The induction process is important to Franklin's strategic objectives. The aims of the Franklin's Induction Program include:

- reduction in the cost of the induction process
- increase in the performance and efficiency of staff
- reduction in absenteeism and staff turnover

The Franklin's Induction Program is delivered through a variety of media, including printed materials and video, but primarily it is through computer-based training. Topics covered include:

- history of Franklin's
- how Franklin's is organised
- Franklin's products and own brands
- dress standards and personal hygiene
- policy and procedures
- career paths, reward and recognition
- customer service
- food hygiene

The motivation for the development of training program was to deliver induction at a lower cost, as well as to reduce turnover of team members. The aim of the program was to move from induction offered by trainers to induction undertaken through computer-assisted learning. One of the benefits of computer-assisted learning is that it facilitates the standardisation of the induction process across all regions where Franklin's stores operate.

Evaluation

The evaluation presented here focusses on the impact of the induction program on the induction process. This is undertaken by considering the costs and benefits associated with the program over several years. In this case study, discounted cash flow analysis is used to investigate the returns from training, arising over several time periods. Discounted cash flow analysis is necessary because the costs and benefits in different time periods are not comparable and the technique of discounting makes costs and benefits in the first year comparable with every other year.

The steps taken to calculate discounted cash flows for Franklin's were:

Step 1: Calculate total benefits less total costs. This figure is called *EBITDA*—earnings before interest taxes and depreciation amortisation

Step 2: Subtract taxes from EBITDA to get *net income*

Step 3: Net income after allowance for depreciation results in *net cash flow*

Step 4: Net cash flow is converted into *discounted cash flow*

Step 5: Calculate *cumulative discounted cash flow* by adding all of the discounted cash flows

If the discounted cash flow is positive for a particular year, then a positive gain from training has been realised—the benefits exceed the costs leading to a net benefit for that year. The *cumulative* discounted cash flow is examined in order to assess the *total* net gains from training over a number of time periods.

Impact of induction training and ROI

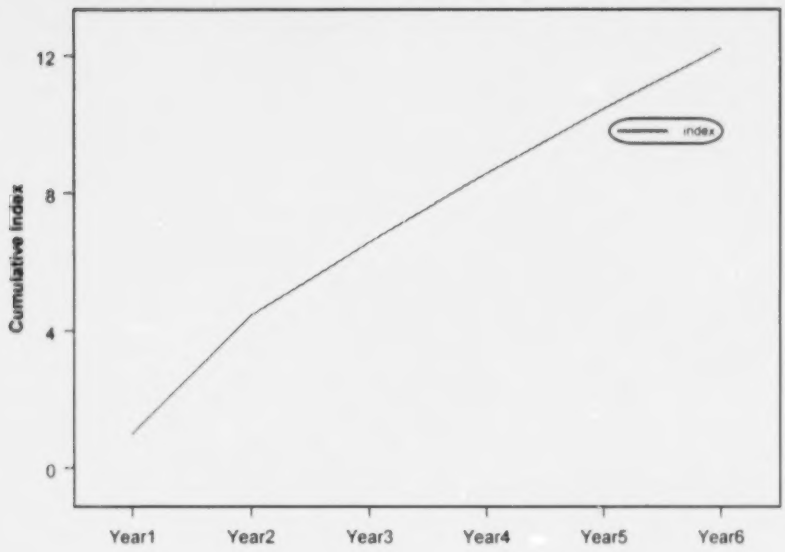
The costs and benefits associated with the Franklin's Induction Program are listed in table 3.8. The benefits (including costs saved) can be estimated by company outlays in the period prior to the introduction of the program to those incurred after its introduction. One of the major benefits of the training program was a reduction by half of the amount of time taken to deliver induction training. Associated with this is a substantial reduction in the number of trainers needed for induction. In addition, effective induction means reduced staff turnover and reduced time to achieve effective performance. As in all the other case studies, the actual dollar value of the costs and benefits incurred cannot be disclosed. However, when the benefits are valued and aggregated together, they are substantial.

Table 3.14: Franklin's Induction Program, costs and benefits

Costs	Benefits
Training delivery	Value of sales generated
Production and supply of training and learning materials	Reduction in trainer wages
Customisation and familiarisation of existing training program	Reduced staff turnover
Trainee wages	
Cost of personal computers	
Software maintenance and modifications	
Support staff training and travel	

The impact of training on costs is evaluated using discounted cash flow analysis, as well as ROI. Given that the costs and benefits are expected to flow over a number of years, it is important to evaluate the returns from training for each of these years, as well as for all of the years combined. Figure 3.5 traces the cumulative discounted cash flow arising from the project over a six-year period. The cumulative discounted cash flows were derived from the steps outlined above using all of the costs and benefits listed in table 3.14. Year 1 is the year the new induction process commenced. The data are presented in the form of an index, commencing with the value of 1 in the first year. It can be seen that by the sixth year, the cumulative cash flow grows from an index value of 1 to over 12, which is an increase of 1100 per cent. For each year, including year 1, a positive discounted cash flow is indicated.

Figure 3.5: Franklins, Induction Program, Cumulative Discounted Cash Flow



While figure 3.5 shows clearly the positive gains from the training program, it is interesting to refer also to the cost–benefit (CB) and rate of return (ROI) associated with the program. The estimated CB ratio for the first year is 269 per cent with an estimated ROI of 169 per cent. That is, each dollar spent on training is estimated to generate $2.69, or a net gain of $1.69 in the first year. In the second year, the estimated CB was 376 per cent, with an estimated ROI of 276 per cent, or an estimated net gain in the second year of $2.76. These rates refer to the estimated gains received in the second year alone (they are not the total gains received for the first two years). For the third year, the estimated CB was 443 per cent and an estimated ROI of 343 per cent, or a net gain in the third year of $3.43. The ROI is growing each year because the net benefits (benefits minus costs) are growing each year.

Summary

In this case study, the delivery of an induction program was changed with the emphasis on computer-assisted learning. The principal benefit of such a program was a reduction in the costs of the induction process. The evaluation process involves an examination of the costs and benefits of the induction process over a six-year period. The time component in the flow of costs and benefits suggests the need to use a discounting procedure. Solid rates of return from training are revealed when discounted cash flow analysis is applied to the induction program.

Training evaluation with matched pairs

The four case studies presented in the previous chapter all used time series data. In this chapter three case study organisations are presented, using matched pairs. The three case study organisations are:

- QR (Queensland Rail)
- Target
- ANZDL (Australia–New Zealand Direct Line)

The matched pairs data used for all three case studies relates to the same individuals for the pre-training period compared to the post-training period. In contrast to the case studies presented in the previous chapter, which used aggregate data over a number of time periods, the data used in this chapter are disaggregated data over two time periods. The disaggregated data used here are the most detailed data that can be used in training evaluation. The level of the individual trainee is the highest form of disaggregation possible. Such detailed data allow the training evaluation process to determine both the overall impact of training, as well as which individuals improved, which individuals lagged behind, and the degree to which individuals' behaviour and performance changed. Because of confidentiality we do not present any results which could identify individuals. Moreover, such results are not of interest to anyone outside the relevant organisation. Individual specific results can, however, be used in addition to the results presented here, as they help to facilitate improving the trainee delivery. For example, by using data on individuals an organisation can identify which trainees benefitted from the training and which ones did not. An organisation can also determine the reasons for success or failure and can adopt strategies that will maximise the gains from training.

Matched pairs can also be arranged by carefully choosing two groups with similar characteristics except that one is trained and one is not, and comparing their performance. This was not attempted in the case studies presented here. In all cases, the same group of people is compared pre- and post-training.

Each case study is different in its own way. The QR case study relates to a government-owned rail transportation company; ANZDL is a privately owned shipping company while Target Australia is a retail company. In the case of QR the trainees are train drivers who were trained using a simulator. For both ANZDL and Target the trainees are managers.

The case studies in brief:

- Training can be undertaken through a number of avenues. In the case of QR, the training, known as the Train Dynamics Concept Development course, was delivered to train drivers using a train-driving simulator. This innovative and increasingly popular way of training offers an efficient means of gathering data and comparing performance.
- The focus of the Target Australia case study is on the measurement of behavioural change arising from training—The Life Styles Inventory Program—and the links between behavioural change and performance. The trainees are store managers. Changes in leadership styles are investigated using pre- and post-training analysis and multiple regression analysis is used to establish links between training and performance.
- In recent years considerable effort has been devoted to strengthening Australian management and business leadership. Leadership training has been identified correctly as important to an organisation's future. However, evaluation of leadership training in Australia is scarcer than other forms of training. With the exception of the Target store managers and the ANZDL case studies, all of the training programs evaluated in this

report relate to non-managerial trainees. In this final case study, ANZDL, a leadership program known as Effective Personal Leadership is evaluated.

For these three case studies we adopt again the four steps process as outlined earlier. Just as for the previous case studies, the data were collected by the organisations themselves. Once this data are available, the evaluation process can proceed sequentially—from pre- and post-training analysis, to multivariate analysis and finally to ROI.

The format for these three case studies is the same as that presented for the earlier case studies.

QR

Organisation profile

QR (formerly known as Queensland Rail) was established in 1865 and is today one of Australia's largest and most modern rail networks, generating about A$2 billion of revenue, through 9400 km of track. QR is a government-owned corporation and operates through seven business groups: coal and mainline freight, metropolitan and regional services, infrastructure services, network access, workshops and technical services, and traveltrain.

QR's principal activities are the provision of transport services to the mining, minerals processing, electricity generation industries, passenger rail, hospitality and tourism, as well as carrying livestock, sugar, grain and other primary products. In 1998, QR had 1114 passenger km (millions), 30 119 net tonnes km (millions) in total freight traffic and employed 14 800 people.

QR's strategic goals are to:

- increase market size and or share for each of its business groups
- reduce operating costs
- ensure staff, customers and the public are provided with a high standard of safety in railway services
- upgrade and modernise infrastructure
- pursue joint venture opportunities with the private sector

QR's vision is to be Australia's best national transport and logistics business. QR's mission is to achieve customer loyalty through:

- service excellence
- innovation
- teamwork and safe operations

In order to fulfill its aims to be a world leader in transport and logistics, QR has six major priorities:

- business performance
- innovation
- safety and security
- growth through market and product development
- progress through people
- national expansion.

For additional information see QR *Annual report* (1998).

The training program

The training program is known as the Train Dynamics Concept Development course. This course involves the application of action research and action learning principles to practical driver training. The program is recognised internationally as best practice.

The aim of the training is to improve operational performance, and encourage train drivers to test ideas on train driving simulators. The program is inspired by the action research model, but extends beyond this model to include co-operation between drivers and interdependence which evolves from practice. Co-operative learning is encouraged strongly in the program.

The Train Dynamics Concept Development course is conducted over a three-full-day period. The aim of the course is for trainees to learn train dynamics at a reduced cost of training. The Train Dynamics Concept Development course is designed to offer training in practical, technical and theoretical skills. (For further details see Wilson 1998.)

Evaluation can be undertaken by comparing train drivers' performance before and after the training program. Of particular interest to QR is the learning of good train-handling. This involves minimising in-train forces in general and reduction of the number and size of the slack action transients (to be discussed later).

Step 1: Data collection, QR

The data used relate to 60 train drivers at two points in time, prior to and after the training. The performance data were collected at the time of training. The trainees were not selected at random. They were nominated by their depots to attend the course. All of the trainees were previously trained train drivers. This program is designed to further improve their train-handling skills.

Key characteristics of the train driver trainees are presented in table 4.1. The average train driver trained was 45-years-old, had a Year 10 education, had 8.5 years of train driving experience and had been employed at QR for 22 years.

Table 4.1: QR, characteristics of train driver trainees

Characteristic	Average value
Age	44.5 years (7.8 years)
Education	Year 10 (1.2)
Years of train driving	8.5 years (6.7 years)
Years employed at QR	22 years (9 years)

Note: Figures in brackets are standard deviations.

In evaluating the training program, four measures of performance were investigated. These were the time taken to drive the train, the fuel used, and the draft and buff forces. Draft and buff forces can be explained as follows. Where wagons are coupled there is a certain amount of slack. This is designed to enable the locomotive to move one wagon at a time when lifting a load. For example, 10 000 tonnes would be difficult to move as one unit, but as each wagon moves forward it then begins to pull the one behind, thus gently increasing the load. This causes other problems as the wagons move over undulations, thus the terms 'buff' and 'draft'. Forces in the couplers between the vehicles of a train change significantly during normal operation. The coupler forces have a tensile or draft component that arises when the train is stretched and a compressive or buff component when the train is compressed. It is the responsibility of the driver to minimise these forces. The evaluation of the train drivers' performance is determined by the minimisation of these forces together with the train operating to timetable, thus the importance of time and minimising fuel use.

The four variables are related and if a reduction occurs in any of these four variables, substantial savings can be made. In some cases a driver may increase fuel use when reducing forces. If this occurs and it is not a significant increase, then it is an acceptable trade-off for

good train-handling. Fuel efficiency and time are obvious performance measures. Draft and buff forces are also important as they impact on rail infrastructure.

Step 2: Pre- and post-training analysis, QR

The pre- and post-training performance measures are presented in table 4.2. Statistical significance was tested using non-parametric techniques. It can be seen from the results presented in table 4.2 that there was a slight increase in the time taken to drive the train after the training. This increase however, is not of economic significance and it is not statistically significant. Moreover, as noted above, some increase in time taken is acceptable if this is a result of improving other aspects of train-handling.

Fuel usage fell by over 4 per cent. However, adjusting the raw fuel usage figure by the load of the train shows even greater fuel savings, of over 6 per cent. This is of economic significance, as fuel is a major cost item. Both the buff and draft forces fell significantly as a result of the training, falling by about 21 per cent and 48 per cent, respectively. These reductions in the draft and buff forces are substantial.

It should be noted that one of the benefits of the simulator training is that there are no interventions other than training, so that the entire performance improvement can be attributed to training.

Table 4.2: QR, all trainee train drivers, pre- and post-training performance analysis

Performance measure	First run pre-training average	Second run post-training average	Percentage change
Time	35.69	35.75	+0.17 %
Fuel usage	132.44	126.84*	-4.42 %
Fuel per load usage	0.19	0.178**	-6.42 %
Draft forces	104.78	71.03**	-47.52 %
Buff forces	119.94	99.41***	-20.65 %

Note: *,**,*** statistically significant at the 10 per cent, 5 per cent and 1 per cent levels, respectively.

Additional insights can be attained by separating the trainees into two groups—a group which improved performance and a group which did not. These results are presented in table 4.3. Approximately two-thirds of the trainees recorded a reduction in buff and draft forces, with over 60 per cent of the trainees reducing fuel usage and half reducing travel time. That is, the training resulted in a significant improvement in the performance of the majority of the trainees. The last column in table 4.3 shows the percentage change in performance for the sub-group of trainees which improved its performance. Compared to the percentage changes for all trainees reported in table 4.2, it is clear that for those trainees who improved their performance, the improvement in performance was statistically significant, as well as of economic value. In particular, the 18 per cent reduction in fuel usage and the reduction in both draft and buff forces of over 40 per cent each, are significant to the organisation.

Table 4.3: QR, performance analysis of the improvement sub-group

Performance measure	Proportion of trainees who improved	Percentage change in performance, improving group
Time	50%	-7%***
Fuel usage	62%	-18%***
Draft forces	68%	-49%***
Buff forces	67%	-43%***

Note: *,**,*** statistically significant at the 10 per cent, 5 per cent and 1 per cent levels, respectively.

It is also interesting to explore the proportion of trainees who improved in more than one performance criterion. These comparisons are listed in table 4.4. A substantial proportion of

the trainees improved their performance in terms of both buff and draft forces. Fifteen per cent of trainees improved in all four performance measures.

Table 4.4: QR, multi-performance improvement analysis

Performance measure	Proportion of trainees who improved	Percentage change in performance, improving group		
Buff and draft forces	45%	Buff	=	-42%
		Draft	=	-49%
		Fuel	=	+1%
		Time	=	-2%
Buff and draft forces and fuel usage	27%	Buff	=	-40%
		Draft	=	-54%
		Fuel	=	-16%
		Time	=	-1%
All four	15%	Buff	=	-37%
		Draft	=	-47%
		Fuel	=	-14%
		Time	=	-7%

Figures 4.1 through 4.4 compare graphically the change in performance for all 60 trainees, before and after the training. The horizontal axis plots the individual train driver and the vertical axis plots the performance measure. These figures illustrate the changes in performance before and after training.

FIGURE 4.1: QR, PRE- AND POST-TRAINING COMPARISON OF TIME TAKEN

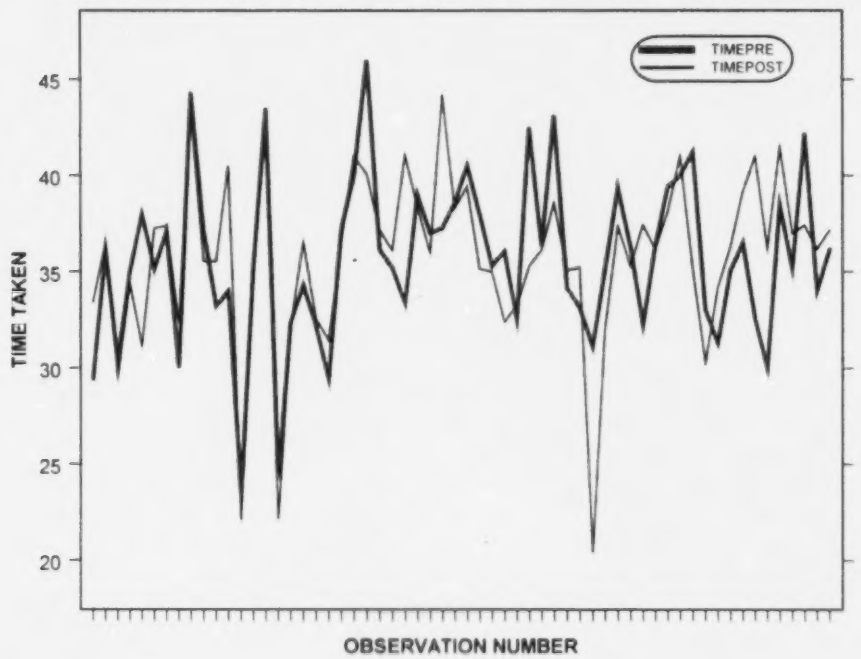


FIGURE 4.2: QR, FUEL USAGE, PRE- AND POST-TRAINING COMPARISON

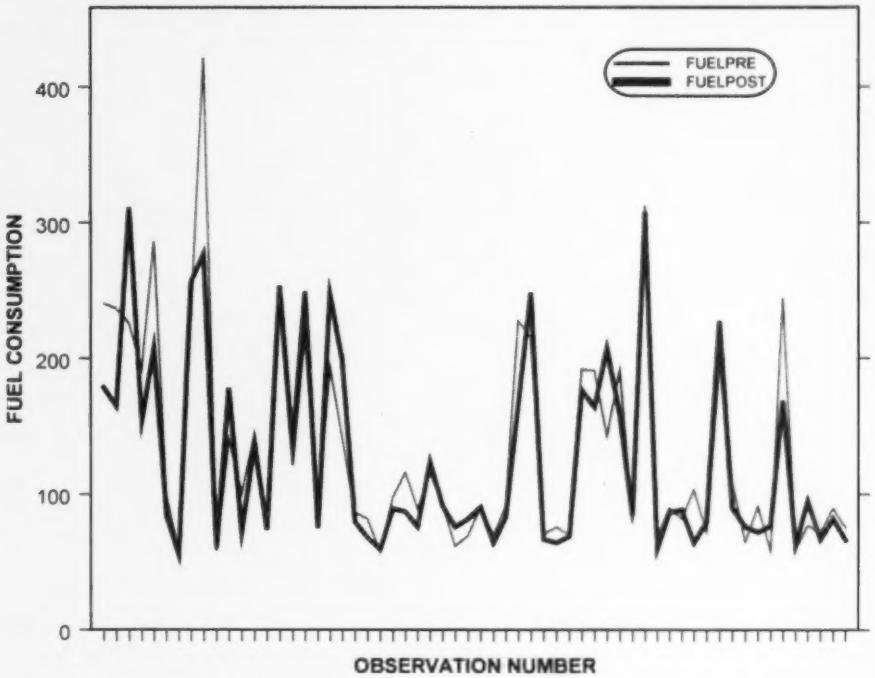


FIGURE 4.3: QR, BUFF FORCES, PRE- AND POST-TRAINING COMPARISON

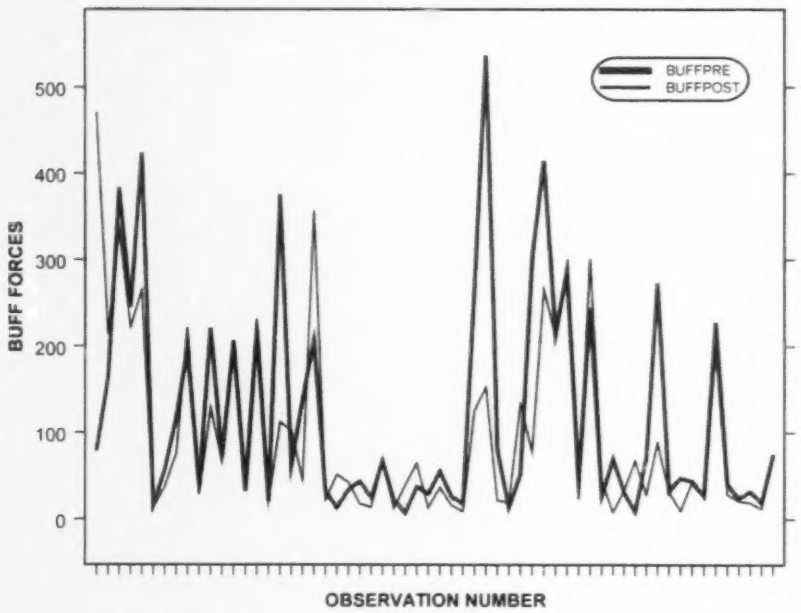
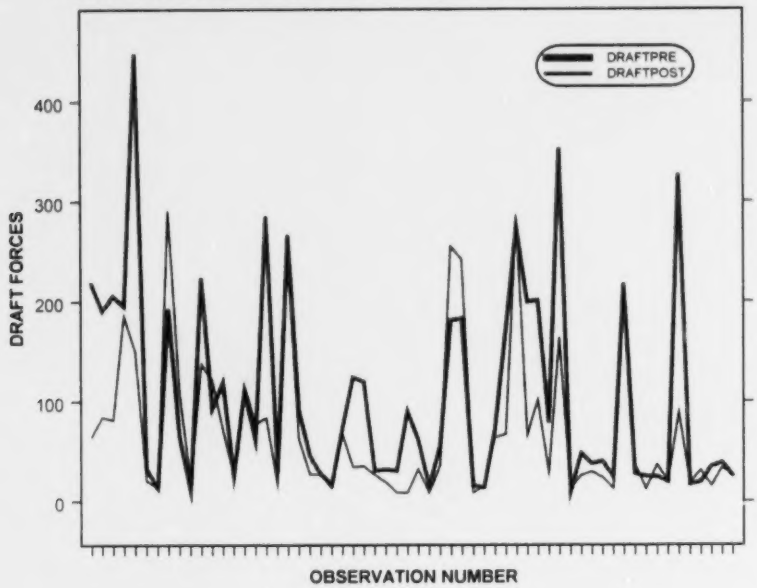


FIGURE 4.4: QR, DRAFT FORCES, PRE- AND POST TRAINING COMPARISON



Step 3: Multivariate analysis, QR

In order to gain additional insights into the effectiveness of training, multiple regression analysis was undertaken. This helps to identify some of the determinants of train driver performance.

For example, in one regression analysis, the dependent variable was the fuel used after training (adjusted for the load of the train). A number of explanatory variables were introduced. These included characteristics of the train drivers, such as their age, education level, the number of years as a train driver, the number of years employed by QR and the depot to which the train driver belonged. The second set of explanatory variables related to the load distribution of the train. This involved controlling for rear-loaded, centre-loaded, block train, mixed passenger, passenger train and Great Southern Passenger Express (GSPE). The GSPE was chosen (the choice does not affect the results) as the basis of comparison and dummy variables were used to represent the other types. The third set of explanatory variables involved individual performance measures—time, draft and buff forces recorded in the pre- and post-training period. The pre-training period measures were included to explore whether the performance before the training influences a trainee's performance after the training. Note that in order to ensure consistency, the length of the track was the same in the pre- and post-training periods.

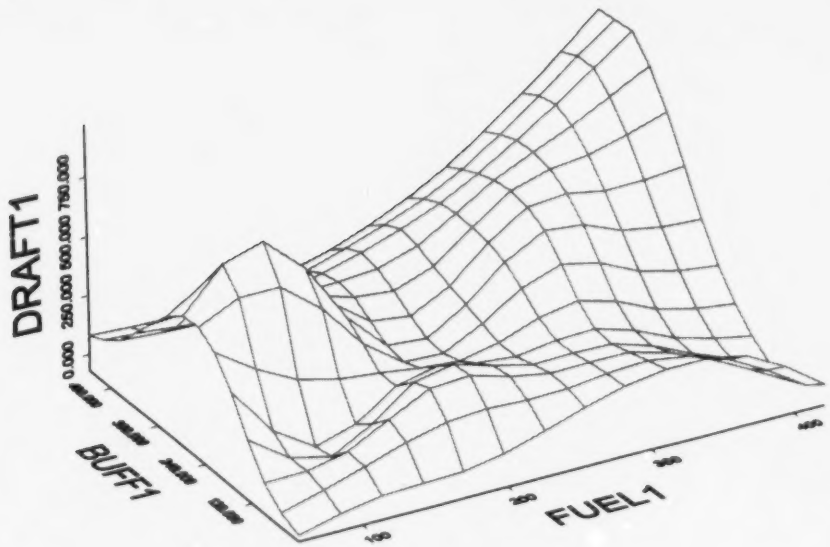
After sequentially eliminating statistically insignificant variables, the final results suggest the following:[6]

- The trainee's depot is an important determinant, with drivers from the metropolitan and regional services groups recording *lower* levels of fuel usage (t-statistic = -3.81, prob-value =0.00).
- As expected the time taken to complete a journey is *positively* associated with fuel usage (t-statistic = 1.30, prob-value =0.21).

[6] The regression passed the usual diagnostic tests. Variables may be retained in a regression as long as the t-statistic exceeds the absolute value of 1, and as long as the inclusion of such a variable makes economic sense and is justified by the diagnostic tests.

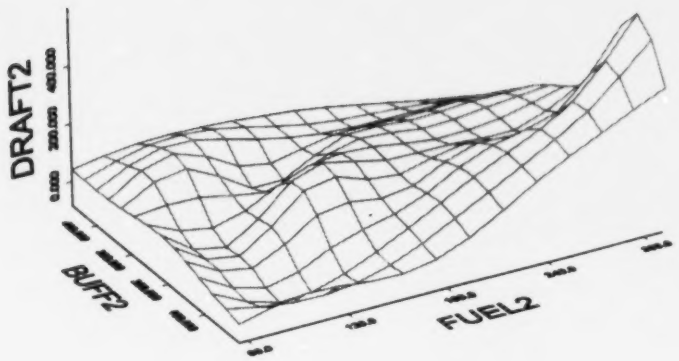
- Centre-loaded, block trains and passenger trains use *less* fuel than the GSPE (t-statistic = -6.07, prob-value =0.00, and t-statistic = -3.05, prob-value =0.00, t-statistic = -2.00, prob-value =0.21 respectively).
- Mixed passenger trains use *more* fuel than the GSPE (t-statistic = 1.65, prob-value =0.10).
- Fuel usage pre-training is *positively* related to fuel usage post training; that is, even though training was found to reduce fuel usage, those who used more fuel in the pre-training period tended to also use more fuel in the post-training period. This is statistically significant at the one per cent level (t-statistic = 4.90, prob-value =0.00).
- Fuel usage is *negatively* associated with buff forces in the post training period (t-statistic = -2.27, prob-value =0.03); that is, the higher are buff forces the lower is fuel used. This result is confirmed by separating the trainees into two groups: those who improved in their buff performance (the majority of the trainees) and those who did not. In the latter group, fuel usage was down 11 per cent in the post-training period compared to the pre-training period, but this was at the expense of poorer handling of the train.

FIGURE 4.5: PRE-TRAINING PERFORMANCE



The multivariate nature of the performance relationships can also be seen by referring to figures 4.5 and 4.6, where draft, buff and fuel performance is compared on the one graph. It can be seen in figure 4.5 that prior to the training, many trainees recorded relatively high levels of draft and buff forces, as well as relatively high fuel usage. This can be seen as the rising slope in the graph. In figure 4.6, this rising slope has flattened out. That is, as a result of training, there is less poor performance with respect to all three of these performance measures.

FIGURE 4.6: POST-TRAINING PERFORMANCE



Step 4: Return on training investment, QR

Calculating an ROI for the train-driver training is more complicated than for some of the other case studies. The major costs and benefits are listed in table 4.5. The costs of the training program include costs associated with travel, accommodation, the costs of the simulator and wages. The main benefits to the organisation are fuel cost savings and savings in maintenance as a result of better handling of the train. Reduction in buff and draft forces will, in general, result in reduced shock to rail infrastructure and hence reduced maintenance costs. Lower bound estimates of the likely reduction in these costs were made by QR engineers.

There are also other benefits arising from better train handling. For example, high buff and draft forces can in certain circumstances cause derailments. Reducing these forces decreases the probability of derailments and also reduces the probability of damage to goods, and disruption to the workforce. Unfortunately, none of these benefits could be estimated with any degree of accuracy, even though these benefits do exist. Given that all of the costs, but only some of the benefits could be quantified, the benefit–cost ratio and the ROI are lower bound estimates. That is, they should be seen as *minimum* rates of return.

Table 4.5: QR, costs and benefits of train dynamics concept development

Costs	Benefits
Travel costs	Fuel savings
Accommodation costs	Reduced maintenance costs
Costs of simulator	Reduced workforce disruption
Wages	Reduced incidence of derailments
	Reduced damage to goods

The actual costs and benefits can not be disclosed. However, the estimated benefit–cost ratio was 130 per cent and the estimated *minimum* ROI was 30 per cent. That is, each dollar spent on train-driver training, returned a *minimum* of $1.3 to the organisation, which is a *net* benefit (cost reduction minus cost of training) of $0.30 for each dollar invested.

This ROI is constructed on the assumption that the benefits are a one-off event. However, it is believed that the benefits are likely to continue over time. That is, the rate of return to train-driver training is likely to be much higher, as the benefits continue to flow over time.

The results presented here relate to only two tests—one before and one after. The organisation believes that performance can be enhanced further by undertaking an additional round of training (a third run), which is designed to polish the train-handling skills. Moreover, by focussing on individuals who are experiencing difficulties or who did not benefit as much from the training process, the financial returns from the training investment will rise.

Summary

The QR case study is an example of a matched sample study. Data were collected on 60 individual trainees pre- and post-training and their performance analysed in relation to four performance measures. The training program involved the use of a simulator which has proven to be an effective medium for on-the-job training. The analysis to date suggests solid financial returns to the organisation. Importantly, the improvements in train handling and benefits are likely to flow also to the users of the trains; for example, passengers will experience much smoother train travel.

Target Australia

The focus of the Target Australia case study is on the measurement of behavioural change as a result of training, and the links between behavioral change and performance. The training undertaken by store managers and the data are individual observations for matched pairs. Changes in leadership styles are investigated using pre- and post-training analysis and multiple regression analysis is used to establish links between training and performance.

Organisation profile

Target Australia is part of the Coles Myer Ltd group, Australia's leading retailer. Coles Myer has annual sales of over A$22.4 billion, a market capitalisation of around A$8.0 billion and is Australia's largest non-government employer with over 154 000 staff. Coles Myer Ltd operates over 1990 stores in Australia and New Zealand.

Target is recognised as the leading apparel and home retailer, operating 130 stores nationally. Target employs more than 23 000 people, many of whom are employed either on a casual or part-time basis. A typical Target store is run by a management team of six to eight managers supported by a staff of 150 to 200 people. Built on its core businesses of ladieswear, menswear, childrenswear, home and entertainment, Target is committed to providing superior quality at value for money prices, customer convenience, and continued trust in the Target brand (see Target, 'Information pack').

The Coles Myer vision is to create benefits for its stakeholders—its customers, staff, suppliers and shareholders—by being the best retailer in every market in which the company operates (see *Annual report 1998*). This is to be achieved, by among other things:

- meeting customer needs through dynamic, innovative, retail businesses which are leaders in value and service
- recruiting, training and promoting outstanding people who are selected and rewarded solely on merit
- building long-term, mutually beneficial supplier relationships
- providing consistently superior returns to shareholders
- being a responsible and caring corporate citizen
- being known for honesty, leadership and open and responsive communication

The training program

While store managers do not primarily control operational issues such as advertising and pricing, they do have input into their inventory management, including how stock is displayed. Their role includes managing the staff within the store and the servicing of customers in a friendly and efficient manner. Managerial effectiveness is important, and it is necessary that store managers have highly developed people and leadership skills. Target's training and development focus has been on behavioural change, emphasising effective productive thinking, increasing constructive behaviours and decreasing less effective behaviour. Behavioural change is expected to facilitate self-growth and organisational development.

Since 1994 Target has been using the Life Styles Inventory program as a tool to assist managers in Target and Fosseys to identify effective and constructive management styles (see *Life styles inventory LSI 2*). This program is run nationally and involves a version of 360 degree feedback that is measured against self-concept and externally benchmarked behaviours. The initial facilitated session is followed up with a retest generally 12 to 18 months later. Life Styles Inventory is a tool that supports behavioural shift by identifying and contrasting constructive with less effective management styles based on long-standing and validated research. Target runs the program over two days. This then involves action planning applied over the period until the retest, which involves a one-day facilitated session.

The aims of the program are to:

- improve employee behaviour (such as risk-taking and creativity)
- create better teamwork
- foster leadership skills
- increase management effectiveness and performance
- create a norm of management behaviour throughout the business based on empowered staff and productive working relationships

A typical Life Styles Inventory program agenda includes:

- effective versus ineffective leaders
- task and interpersonal Skills
- lifestyles awareness: the 12 different behavioural styles
- Life Styles Inventory feedback: self-concept and Life Styles Inventory 2 feedback: others
- action planning

Step 1: Data collection, Target Australia

The evaluation was conducted using matched data for managers located at 39 individual Target stores. These data were made available by Human Synergistics, consultants used by Target to run the program. While the program has been applied to all Target stores so that all store managers have undertaken the program, there is a very high degree of mobility among store managers. Consequently, the data set has been limited to 39 store managers who had remained in and managed the same store in the pre- and post-training period.[7] These stores are distributed across all Australian States and should be fairly representative of the rest of Target's store population.

Through the Life Styles Inventory program, 12 thinking and behavioural styles are measured. These are: 'humanistic-encouraging'; 'affiliative'; 'approval'; 'conventional'; 'dependent'; 'avoidance'; 'oppositional'; 'power'; 'competitive'; 'perfectionistic'; 'achievement'; and 'self-actualising'. Some of these are defined below. (For full details see *Life styles inventory LSI 2*.)

[7] In most of the analysis, the sample size used is reduced to 33 stores, as there were insufficient data for some of the variables of interest.

Some of these behavioural styles, like 'humanistic-encouraging', are expected to be conducive to managerial efficiency, while others, like 'oppositional', are expected to reduce effectiveness.

The evaluation is undertaken by comparing change in measured behaviour scales and actual store performance. Store managers were rated in each of the 12 behavioural styles. The ratings were made by the individual store manager, peers, supervisors or reportees. These people were judged to be able to provide honest and constructive feedback. First, pre- and post-training analysis is undertaken and then a multivariate analysis.

Step 2: Pre- and post-training analysis, Target Australia

Analysis of pre- and post-training scores shows that the training program reduced the incidence of several of the defensive/less effective behavioural styles. The largest reduction occurred in the mean value of the four behavioural styles listed in table 4.6. Both parametric and non-parametric tests indicate that the decline in these less effective styles is statistically significant. Importantly, these reductions are desirable from Target's perspective. For example, a lower mean scale for the 'dependent' scale is indicative of greater managerial effectiveness and a lower mean scale for the 'power' scale is expected to be associated with higher productivity (see *Life styles inventory LSI 2*, for full details). The fourth column in table 4.6 lists the proportion of store managers who improved in their behaviour; for example, 94 per cent of the store managers recorded a reduction in the 'conventional' style.

Table 4.6: Target Australia, store managers: Reduction in negative behavioural styles, matched pairs[1]

Behavioural style	Pre-training mean	Post-training mean	Proportion of store managers improving
Conventional	0.535	0.387***	94%
Dependent	0.450	0.339***	88%
Power	0.289	0.206**	76%
Perfectionistic	0.611	0.452***	94%

Note: 1 Scores are adjusted to ensure compatibility between the post-training and pre-training scales.

, * statistically significant at the 5 per cent and 1 per cent levels, respectively.

The next step is to explore the links between changes in the measured scales for each behavioural style and performance. The measure of performance analysed here is sales growth. This is the change in store sales from the pre-training period to the post-training period. Sales growth was first correlated with the scores attained for each of the 12 behavioural styles. When the entire data set is used, that is for all stores, the highest correlations were between sales growth and 'humanistic-encouraging' scale (correlation coefficient = 0.28, statistically significant at the 10 per cent level) and the 'achievement' scale (correlation coefficient = 0.38, statistically significant at the 5 per cent level). The 'humanistic-encouraging' scale captures participative leadership, with a focus on growth and development of people around them which: 'inspires self-improvement by teaching subordinates to think for themselves, and build problem-solving skills and confidence' (*Life styles inventory LSI 2*, p. 21). Achievement is associated positively with sales growth. 'Achievement managers are skilled problem solvers, action-oriented decision makers and calculated risk takers' (*Life styles inventory LSI 2*, p. 106).

The correlations between sales growth and the behavioural scores recorded after the training program, using the preferred matched data set, are listed in table 4.7. Once again, the constructive styles, such as 'humanistic-encouraging' and 'achievement' are positively correlated with sales growth. Higher scores for 'self-actualising' (confident and creative and flexible in thinking) and 'affiliative' (warm, trusting and socially skilled and emphasizing team work) are also positive to an organisation. Hence the positive and statistically significant correlation with sales growth is encouraging. The negative correlation with 'avoidance' (avoiding responsibilities, self-doubt and fear of failure) is expected. The third column in table 4.7 lists the proportion of store managers who improved their leadership style.

Table 4.7: Target Australia, store managers: Correlations between post-training behavioural styles and sales growth, matched pairs

Behavioural style	Simple correlation coefficients	Proportion of store managers improving
Humanistic-encouraging	0.37**	50%
Affiliative	0.32*	43%
Avoidance	-0.32*	50%
Achievement	0.39**	52%
Self-actualising	0.46***	61%

Note: *, **, *** statistically significant at the 10 per cent, 5 per cent and 1 per cent levels, respectively

Step 3: Multivariate analysis, Target Australia

The analysis presented in tables 4.6 and 4.7 above abstracts from the multivariate nature of the sales growth process. In order to place the impact of training in its proper context, it is important to introduce into the analysis the influence of factors other than training. As in the other case studies, multiple regression analysis can be used to draw the relevant inferences.

The data once again relate to the matched stores. The dependent variable is the change in sales adjusted for the total floor space of the store.[8] A number of explanatory variables are included. The key variables of interest are the behavioural styles. These variables are calculated as the *change* in the scale recorded for each behavioural styles. This is the change in the behavioural scales from the pre- to the post-training period. This allows testing for a hypothesised link between sales growth and change in behaviour, resulting from the training. In addition to these, State dummies were included to capture any differences in the competitive and regulatory environment in the State in which the store is operating. The change in hours worked was included to capture the contribution of labour (the sum of casual, part-time and full-time employees). Finally, the gender of the store manager was also included, as an additional control variable (22 per cent of the store managers in this sample are females).

In all of the regressions, the 'humanistic-encouraging' style is always statistically significant, at least at the 5 per cent level. Because of the low number of observations relative to the large number of potential explanatory variables, there is a danger of both multicollinearity and the possibility that the multiple regression analysis will not identify properly the relevant associations. It is thus important to simplify a model with many variables to what may be regarded as the more important relationships. After sequentially exploring a number of regressions and eliminating statistically insignificant variables, a final and preferred multiple regression model was arrived at. From the final regression analysis the following inferences can be drawn:

- Sales growth is *positively* associated with 'humanistic-encouraging' styles. The higher is the change in this scale, (post- minus pre-training), the greater is sales growth. This is statistically significant at the 1 per cent level.
- Sales growth is *negatively* associated with 'affiliative' styles. The higher the change in this scale, (post-minus pre-training), the lower is sales growth. This is statistically significant at the 1 per cent level. This is the opposite of the result presented in table 4.7, and arises because in table 4.7 the influence of other factors was not controlled for.
- Sales growth is *positively* associated with 'achievement' styles. The higher is the change in this scale, (post-minus pre-training), the greater is sales growth. This is statistically significant at the 1 per cent level.
- Sales growth tended to be *lower* in some States, with statistical significance varying from 1 to 5 percent, depending on the State.

[8] This analysis can also be undertaken using unadjusted sales growth. This does not change the conclusions regarding the change in behavioural style variables.

- Changes in hours worked were *positively* associated with sales growth. This is statistically significant at the 10 per cent level.

The adjusted R-square associated with this regression was 0.55, and the regression was free from heteroscedasticity (heteroscedasticity is a common problem in cross-section analysis). This regression analysis presents strong evidence that the Life Styles Inventory program did have a positive impact on sales growth. While the 'affiliative' style has a negative association with sales growth, the 'humanistic-encouraging' and 'achievement' styles taken together have a greater impact, so that the *net* effect of these three styles is to increase sales growth.

Sales did not increase in all stores post-training. Many factors affect a store's sales performance, such as changes in the degree of competition, advertising, pricing and customer shopping patterns. These are independent of and outside of the control of the store manager. Thus, care has to be taken in inferring that training is the only factor that contributes to sales growth. Indeed about 45 per cent of the variation in sales growth was left unexplained, and this can be attributed, in part, to factors not included in the analysis. It can, however, be concluded that the evidence presented above suggests strongly that there is a positive link between sales growth and changes in behavioural styles.

Step 4: Return on training investment, Target Australia

The costs and benefits associated with the training program are listed in table 4.8. As in a number of the other case studies, the costs associated with the program can be easily identified, while the benefits cannot. The actual costs, benefits and net benefits in dollar terms cannot be disclosed, but they are considerable.

While the focus of the analysis presented here has been on sales growth, the Life Styles Inventory program has produced other benefits. For example, figure 4.7 compares staff turnover, of full-time employees, over a six-month period pre-training with a similar period post-training. The average ratio of staff turnover across the stores studied fell by 37 per cent in the post-training period. This is statistically significant at the 10 per cent level. Turnover among part-time employees fell by 5 per cent (not statistically significant), and turnover among casual staff fell by 6 per cent (statistically significant at the 1 per cent level).

FIGURE 4.7: TARGET, STAFF TURNOVER, FULL TIME EMPLOYEES

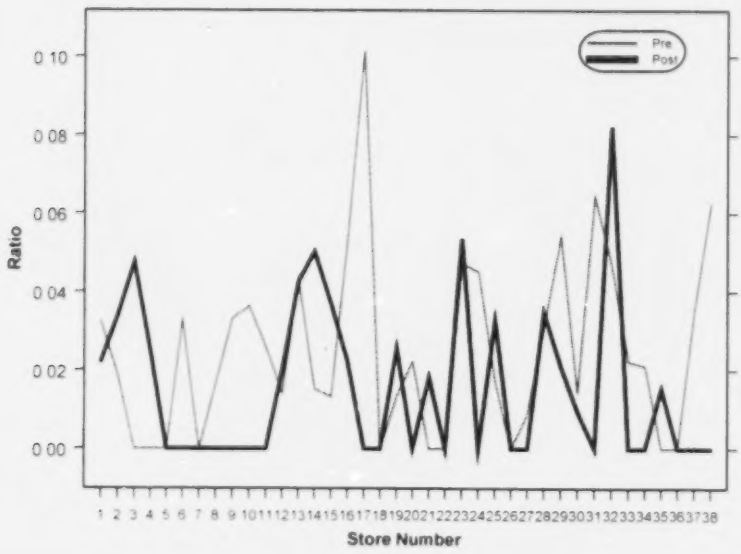


Table 4.8: Target Australia, costs and benefits of Life Styles Inventory program

Costs	Benefits
Travel costs	Additional sales
Consultants fees	Reduced stock shrinkage
Cost of venues, meals and accommodation	Reduced staff turnover
Material costs	
Labour costs :store managers	
Labour costs: trainer	

Taken together, the coefficients from the multiple regression analysis, on the leadership styles imply a net increase in sales of about 1.4 per cent. Over the period studied, sales rose by close to 10 per cent. The assumption made here is that 1.4 per cent of the sales increase is due to the impact of training, and the remainder is due to other factors which have impacted favourably on sales growth. When this is translated into a dollar value and the total costs of the program considered, the cost–benefit ratio is 1080 per cent and the ROI is 980 per cent. That is, for each dollar allocated to the program, $10.80 dollars were returned, or a net gain of $9.80 for each dollar invested.

Summary

The Target Australia case study is another example of a matched sample study. Data were collected on 39 individual store managers' pre- and post-training behavioural styles. In addition, data were collected for variables such as sales performance, staff turnover, and characteristics of the stores they managed. The analysis reveals that significant reductions occurred in some of the less effective behavioural styles, and significant improvements in some of the constructive behavioural styles. Importantly, changes in some of the constructive behavioural styles were positively associated with sales growth and reduced staff turnover. The results presented here show clearly that what are often regarded as 'soft skills' can and do impact favourably on sales growth.

Australia–New Zealand Direct Line

Organisation profile

Australia–New Zealand Direct Line (ANZDL) is owned by Canada Pacific, providing containerised ocean transportation services between Australia, New Zealand, North America and the Pacific Islands, for both importers and exporters. ANZDL has more than 300 employees worldwide, with one-third employed in Australia.

ANZDL is known in the industry for quality, leadership and innovation-driven improvements. The company has been ISO 9002 accredited since 1994, and has won numerous performance and safety awards, including the Australian Quality Award for Business Excellence in 1998.

ANZDL's overall approach to business excellence is based on three key practices:

- strategic deployment: values, mission and plans
- daily process management: process control and improvement
- structured problem-solving: leadership

ANZDL exceeds the requirements of its customers by regularly supplying reliable transportation and distribution services supported by measurable service commitments that ensure added value to the overall transportation process. These measurements encompass the following are as:

- timely and accurate documentation
- schedule integrity on land and sea
- timely availability of clean, cargo-worthy equipment
- proactive and responsive customer service
- price competitiveness

(Further details about ANZDL can be found in *Australia–New Zealand direct line: Australian quality award winner 1998*, published by the Australian Quality Council).

In its mission statement, ANZDL states that it aims to be its customer's preferred service provider. The company's stated values and culture are:

- focus on customer requirements
- optimise consistently on resources
- take ownership and accountability for results
- make every day count
- outward focussed and forward-thinking
- self-reliant people working as a team

This approach is underpinned by four principles, consistent with the company's values: respect for people; fact-based decision-making; customer focus and continuous improvement.

The aim of ANZDL's training and development program is to develop a company of business people, with a focus on the integration and linkage among staff, activities and achievement. The program, therefore, promotes the need for employees to master several types of business skills as well as providing latitude for personal and professional growth.

The training program

The training program is known as Effective Personal Leadership and was delivered by an outside consultant. This program is aligned to the Generic Management Competency Standards for Frontline Management endorsed by ANTA (see the *Frontline management development kit* 1998). It was delivered to a group of 21 managers, including the Australian general manager, a vice-president, department heads and supervisors from two departments. The program consisted of 15 sessions of 2 hours each, over a period of 18 months.

The Effective Personal Leadership program covers a number of areas, including:

1. Understanding the role of leadership and coaching
2. Improving team management
3. Developing appropriate soft skills
4. Enhancing employee attributes and behaviours
5. Developing and coaching self directed work teams
6. Eliminating leadership inhibitors
7. Improving decision making skills
8. Planning and goal setting
9. Increasing personal and team productivity
10. Understanding vision, mission and values
11. Enhancing communication skills
12. Improving delegation abilities
13. Identifying high pay-off activities

14. Improving the team's performance

15. Creating a culture of inspiration and motivation.

Each participant had a nominated mentor with whom to discuss progress made during the course. One of the important components of the program was the establishment by each trainee of 'win/win' goals from an organisational as well as an individual perspective. Evaluation was undertaken in three stages. Pre-course evaluation involved establishing objectives to ensure measurable outcomes. A mid-course evaluation was conducted to ensure that win/win agreements were implemented and acknowledged. The aim of a post-course evaluation was to review progress in attaining predetermined objectives.

Evaluating the impact of leadership training is usually more difficult than other types of training. The nature of leadership and management mean that it will *rarely* be the case that changes in productivity and cost savings could be attributed to leadership training alone. More so than in other training programs, the evaluation process will be one of searching for evidence in favour of a stated impact rather than conclusive proof. Most of the time, this will involve a combination of qualitative as well as quantitative information. For this case study, the evaluation process involves steps 1, 2 and 4. Multivariate analysis was not possible for this case study. Qualitative information is used to assist in inferring the impact of training on ROI.

Step 1: Data collection, ANZDL

Of particular importance to ANZDL are the contributions of the program to: the setting and achievement of goals; communication between departments; and team productivity. Each of the trainees was asked to rank the extent to which a set of organisational goals and objectives had been attained. These responses were collected before the training as well as after the training. These data are used for pre- and post-training analysis and is a matched pairs data set.

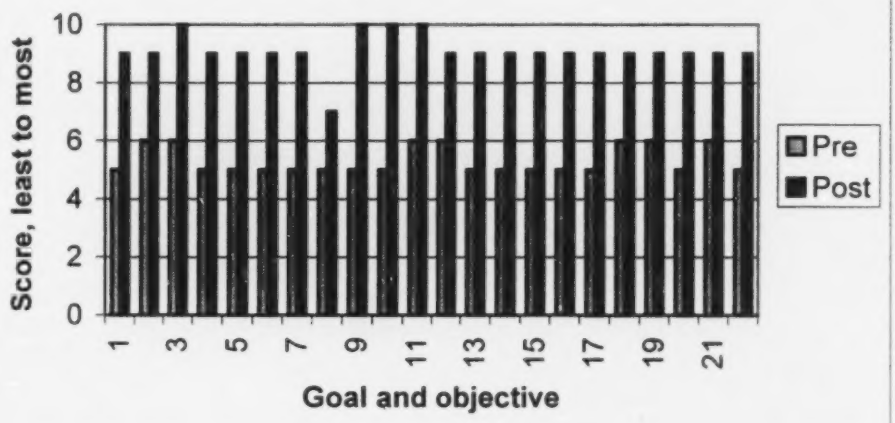
Seven of the 22 organisational goals and objectives are:

- communication between departments
- ability to set and achieve goals
- business project planning
- time management
- ability to listen effectively
- individual motivation of team members
- team productivity

Step 2: Pre- and post-training analysis, ANZDL

Figure 4.8 compares the average pre- and post-training scores for each of the 22 items. Each trainee used a scale ranging from 1 to 10, with 1 as least and 10 as most, to rate each of the 22 categories. Hence, the higher the score, the higher is the participant's perception of the degree to which organisational goals and objectives have been attained. The scores are listed on the vertical axis and the objectives are listed on the horizontal, and are numbered from 1 to 22. It can be seen that post-training, the scores increased for each and every one of the 22 organisational goals and objectives. The differences in the pre- and post-training scores were tested for statistical significance. Non-parametric statistical tests revealed that the differences in the scores are statistically significant at the 1 per cent level. These differences are real and are not due to chance. The conclusion drawn is that the organisational goals and objectives scores are statistically significantly higher in the post-training period, indicating that the degree to which these organisational goals and objectives have been attained has increased.

Figure 4.8: Organisational goals and objectives, ANZDL



Step 4: Return on training investment, ANZDL

It was concluded above that the degree to which organisational goals and objectives were attained was higher in the post-training period. This conclusion was drawn from data based on perceptions. While there is no evidence to suggest that these perceptions are erroneous, it is prudent to support these perceptions with more objective data. If organisational goals and objectives are satisfied to a greater extent in the post-training period, then this should be reflected in other data.

The costs and benefits associated with this training program are listed in table 4.9. Once again, the costs can be identified easily, but the benefits cannot. At the time of preparing this report, the training program had recently been completed. Thus, while the costs of the program had been incurred, most of the benefits had yet to flow. Hence, a true ROI cannot be calculated yet, and the estimated ROI is likely to *understate* the real ROI. The future benefits can be seen when the targets set by the participants are analysed. Some examples of targets resulting from the Effective Personal Leadership program include:

- to achieve a significant reduction in overall equipment repair cost
- to reduce storage costs to customers by streamlining storage processes
- to achieve an average score of 5 or greater in the employee satisfaction survey (based on the 1–6 Likert scale)
- to deploy 'world's best practice' for the carriage of hazardous materials
- to increase staff productivity from prior year levels and achieve a decrease in administrative costs through work process simplification

A timeline has been specified for these and many other targets.

Table 4.9: ANZDL, costs and benefits of Effective Personal Leadership

Costs	Benefits
Materials	Improved productivity through improved communication
Facilitation time	Improved productivity of meetings
Labour costs: participants' time	Personal effectiveness: self-esteem, confidence, thoroughness and accuracy, problem solving, goal setting and prioritizing
	Costs reductions through improved efficiency

Two examples illustrate the actual benefits derived from the training program. The first example comes from a goal of reducing administration costs, attained by eliminating unnecessary suppliers. In addition to reduced agency costs, other benefits associated with this goal include a service that is technologically driven and in the long term simplified. ANZDL will also have greater control over service levels and improved communication with customers. The second example, was a goal of increasing staff productivity in a division and cost savings in administration through a work process simplification. Both of these resulted from the training program. As in the other case studies, the actual dollar values of the costs and benefits cannot be disclosed. These two examples alone led to benefits in excess of the actual program costs, with a CB of 423 per cent and an ROI of about 323 per cent. That is, for each dollar invested in the training program, a net gain of $3.23 was made. While the gains cannot be attributed entirely to training, the evidence suggests that the benefits are at least in part attributable to training.

When the benefits of training cannot be attributed solely to training, it is necessary to seek additional information. First, it is important to ask whether the costs of the training program have been exceeded by the benefits since the training commenced. If so, then this indicates that whatever the cause of the changes, the benefits have exceeded the costs and that there is at least a *net* benefit. The ROI of 323 per cent indicates that this criterion was satisfied.

Second, if data are available, it is desirable to undertake a multivariate analysis and to separate the impact of training. For example, it is possible that even though there has been a net benefit since the training, the training itself may have made no contributions, or even could have had a negative effect. Other factors may have more than offset the zero or negative effect of training. Because of the nature of this training program this sort of analysis could not be undertaken.

In the absence of quantitative data supporting the contribution of training, analysts can seek qualitative information. In the case of ANZDL, the participants by and large agreed that the program made a positive contribution to their leadership skills. For example, participants commented that the program increased their awareness of proper planning and time management. The impact of training can be seen from the numerous favourable comments collected during the evaluation process:

- *'My time is more organised and this has helped me devote more time to projects and also to spend time with staff as required. More efficient use of my time—time is money.'*
- *'I am able to communicate better by providing detailed explanations of tasks and deadlines. This helps in project close out and productivity.'*
- *'My attitude has always been positive. No measurable affect on productivity personally but businesswise the group's productivity has improved.'*
- *'More motivated, desire to achieve goals.'*
- *'Better organised; better goal setting; positive thinking—I can.'*
- *'I am looking for ways to put forward improvement suggestions.'*
- *'Have become more clever and confident in doing things.'*

It can be concluded from such feedback that training was unlikely to have had a zero or a negative impact. Importantly, many of the trainees felt that the training improved their work and family life, so that the training benefitted them individually, as well as contributing to the organisation's goals. There is always a danger of the 'halo' effect from any qualitative evaluation; however, these and other responses can be taken to be genuine. Given the composition of this group of trainees, we could not expect them to respond in a favourable manner just to please the trainers.

Summary

The ANZDL case study demonstrates a practical approach to the evaluation of leadership training. In this case study, the perceptions of a group of managers post-training was compared to the pre-training period. The perceptions matched some of the objective data collected to date. The results to date show that the achievement of organisational objectives has improved and that the organisation has recouped the costs of the training program. The indications are that these returns are likely to increase in the future.

Review and extensions

The aim of this chapter is to review the seven case studies and the training evaluation methodology, to draw inferences from them, and to discuss the degree to which the framework can be generalised. The chapter commences with an evaluation of training evaluation and the four-steps process in particular. Then, the case studies are reviewed and summarised. Finally, inferences are drawn from the analysis.

Review of the four-steps process

The four steps represent a general process of training evaluation; that is, other models, such as Kirkpatrick's model are contained with it. The four steps form a logical and sequential process of evaluation. The four steps are:

- Step 1: Data collection
- Step 2: Pre- and post-training analysis
- Step 3: Multivariate analysis
- Step 4: Return on training investment

As noted in the text and applied to the case studies, training evaluation requires at a minimum step 1 and any of the other three steps as essential to any training evaluation. Organisations can choose, depending on their interest and data availability to pursue steps 2, 3, or 4, or any combination. The recommended approach is to evaluate training using ALL four steps together, but this may not always be possible, and may not at times be necessary.

The four steps represent a simple, although not always easy, method of evaluating training. The four steps can be applied at any stage of evaluation. For example, if strategic evaluation is needed, then the four steps offer an excellent approach. First, data are collected and then pre- and post-training analysis is used to detect changes in behaviour and performance. Multivariate analysis is used to identify the extent to which training can be attributed, at least in part, to have improved performance. Finally, the return to training investment can be calculated and training evaluated with respect to strategic objectives. In the case of the Huntsman Chemical Company this process was applied, from the collection of data to evaluation of the contributions of training to corporate strategic objectives.

If, for example, the evaluation is to be conducted on training designed to enhance function and operational skills, known as 'skills evaluation', the four-steps model can be used again. First the data will need to be collected (step 1). Second, skills pre- and post-training will need to be compared (step 2). Additionally, analysis can extend to multivariate analysis (step 3), to identify the extent to which changes in skill levels were the result of training, or other factors, such as the trainee's education level. At the skills evaluation stage, step 4 will not normally be pursued.

As illustrated in the seven case studies, the four-steps process of training evaluation can accommodate a variety of training programs, data sets of different quality, and can be applied to any level and stage of evaluation. The four steps represent an excellent methodology for evaluating training.

Review of case study organisations

In this report, seven case study organisations were showcased. The organisations differ in relation to their profiles, in particular, to ownership structure, industry and training programs. The seven organisations, Australia–New Zealand Direct Line, the Huntsman

Chemical Company, Franklin's, Kodak Australasia, Mission Australia, QR and Target Australia, are a self-selected group. That is, the case studies represented here are not an ideal random sample drawn from a large number of organisations. These organisations agreed to become case study organisations, and agreed to have their training programs scrutinized. While a random sample is the ideal, such an analysis is not practical in the current environment. Trainers in most cases appear stretched in terms of available resources, and while there is substantial interest in evaluation, few resources can be devoted to it. This is one of the main reasons why relatively little evaluation of training is undertaken in Australia. It is hoped that the case study organisations presented here will serve as a catalyst to other organisations to commit to training evaluation, whether carried out in-house or outsourced to consultants.

A critic may argue that all of the case studies recorded a positive ROI because only those organisations with positive ROI agreed to be evaluated. An argument can be made that only successful case studies have been included and unsuccessful ones have not. With the exception of one case, none of the case studies was aware of the rates of financial returns from their training program. Most had an idea of *some* of the benefits, but had not undertaken training evaluation. The results presented here are largely new to the organisations themselves. What characterised these organisations was a commitment to the evaluation of training. Training was seen as an important investment to all of the case study organisations, and there was a genuine concern to identify the returns they received from training. Moreover, the case study organisations have a genuine concern to maximise the ROI on their training investment. Our conclusion remains that organisations which are committed to training will be financially rewarded from it.

Not all training programs will pay off. However, in order to find out if a training program has resulted in a net benefit, it is necessary to undertake some sort of evaluation. When training programs do not result in a net benefit, it is important to find out why. In such cases, among other things, it is important to determine whether the training program was relevant, whether it was poorly delivered, whether the trainees were receptive to training, whether the trainees had an opportunity to learn, and whether the trainees had an opportunity to implement what they have learned. Similarly, when training does payoff, the organisation may want to investigate further to determine why it was that training resulted in a net pay off. In particular, an organisation may seek to investigate whether additional benefits could have been generated and what improvements can be adopted the next time the training is undertaken. As was noted in some of the case studies, not all individuals improved equally and not all improved after training. This is to be expected. The challenge remains for the organisations to tailor training programs and ensure they are delivered in a fashion that generates the greatest return.

We have presented estimates of the ROI training for each of the seven case study organisations. There is, however, a difference between returns from training and the *effectiveness* of training. The effectiveness of training investment addresses the issue of what ROI could have been attained, as opposed to what ROI was actually attained. This involves a comparison of the estimated ROI and the *potential* ROI. In general, actual ROI will be less than potential ROI. The divergence between ROI and potential ROI is an indication of the lost opportunities for improving performance.

The issue of potential ROI involves analysis of factors such as whether the appropriate type and quality of training were delivered, whether training targets were met and whether training skills and knowledge were fully applied. For most of the case study organisations, the actual ROI was less than potential. This was acknowledged by the organisations themselves. For example, in some cases training was compulsory. However, not all people requiring training could be trained because of the need to maintain production or other commitments. These are practical constraints that limit the coverage of training within a certain period and hence restrict the returns from training. Some of the organisations felt that the training could be improved in certain respects to better capture benefits arising from training. Training delivery and evaluation is often very much itself a process of learning, with potential for improvement.

Inferences drawn

In this section we address a number of issues that may be relevant in terms of drawing inferences from this work. We present a number of frequently stated assumptions and answer them in light of our findings. These relate to the links between ROI and costs, the links between ROI and industry and the links between ROI and the size of the organisation.

The case study organisations are not necessarily representative of the types of organisations operating in their industries. However, we can draw the following conclusions from them:

- There is a diversity of training programs undertaken by firms and these are delivered to diverse groups of trainees.
- There are various costs incurred by such training programs.
- There are various benefits generated by such training programs.
- The magnitude of some of the changes in performance arising from training are substantial and in all seven case studies are of economic significance.
- There are significant net financial benefits to firms from training.
- There is substantial variation in rates of return from training.

Hypothesis 1: You need to spend money in order to make money.

It is necessary to 'spend money to make money'. That is the nature of any investment. Training will always incur a cost. The case studies presented in the text highlight the most likely costs incurred in training. Without such costs training could not be undertaken and the positive benefits from training could not be realised. For many organisations investment in their workforce will be the most important investment they will make.

Hypothesis 2: You need to spend a lot of money in order to make a lot of money.

This hypothesis is not necessarily true. Some of the training programs evaluated in this report incurred relatively little cost, while others incurred substantial costs. Because of confidentiality considerations, the actual dollar value of the costs (and benefits) of training have not been presented here. However, there does not appear to be a strong link between the dollar value of the costs of training and benefits from training. This does not imply that organisations need to spend as little as possible. The correct approach is to undertake well-designed, relevant and high-quality training.

Hypothesis 3: ROI depends on the industry of operations.

Are rates of return dependent on industry? There is no evidence for this hypothesis from the case study organisations. While we would expect that there would be some link between returns and industry, there is nothing to suggest from our investigations that this is the case. This is an important issue which would need a large number of organisations and in a range of industries, to confirm the finding. The results presented here show that rates of return are not dependent on industry, but on the training program.

Hypothesis 4: Only large organisations can benefit from training.

All of the case study organisations can be considered to be either medium to large. There is no reason to conclude that only large organisations can benefit from training. Similar rates of return on training can be attained by smaller organisations, as long as the training is relevant, well-delivered, and the trainees have an opportunity to apply their new learning, skills and knowledge.

Hypothesis 5: Only large organisations can evaluate training adequately.

Resource constraints are a major inhibitor to training. Larger organisations have potentially greater access to resources and hence it should, on that consideration alone, be easier for them to evaluate training. However, during the preparation of this report it became clear that large organisations also face resource constraints and that training evaluation often receives a lower priority to other training functions.

The important factor behind training evaluation appears to be the motivation and willingness to do so. The four-step process can be adopted productively by all organisations, and there is no reason why smaller organisations can not adopt this as a training methodology.

Future research

The case studies presented here illustrate the gains achievable from training. In addition to these financial gains, the training programs also generated non-pecuniary benefits. For example, a safer workplace as a result of training enhances quality of working and non-working life, and reduced staff turnover is often associated with greater job satisfaction. These benefits are difficult to quantify. Moreover, they are returns to the workforce beyond those derived for the firm. This is an important by-product—and often an induced product—of the training process. This is also an issue that warrants investigation within the Australian context.

There are other issues which require further investigation. For example, the links between training and efficiency and technical change remain unexplored. It is important to investigate the contributions made by training to improving the efficiency of production and service delivery. Training is often introduced together with new technology. However, training itself can act as a catalyst to further technological change. These are all important issues that merit investigation.

Training is only one of the investments made by an organisation. Organisations make a whole range of investment decisions, including research and development, new products, expansion into new markets, new technologies and new accounting and information systems. The returns they get from these investments will vary, and not all will necessarily generate a positive rate of return. In the past several years members of the project team have held numerous discussions, seminars and conferences with organisations, both large and small, and it is clear that training is often one of the few significant investments that is not evaluated. It is hoped that the analysis and evaluation framework presented here will serve as a catalyst for firms to commit to training evaluation.

Biographical details

This report would not have been completed without the excellent assistance offered by several people from the case study organisations. Their commitment to collecting the necessary data and assisting with the analysis is greatly appreciated. Brief biographical details on the key assisting person from each organisation are presented in alphabetical order.

Teresa George: ANZ Direct Line

Teresa George is the Quality and Training Manager at ANZ Direct Line. Teresa is an accredited trainer with ten years experience, having spent a large part of her career in the public service both as a face-to-face trainer and in managing the training function.

Eddie Paterson: Franklin's

Eddie Paterson is the National Performance Improvement Team Leader with Franklin's Ltd, whose principal task is concerned with the people change management required for major business and IT projects and with improving the performance of team members. Prior to joining Franklin's in 1996, Eddie served in a number of operational and training roles with the Australian Army in Australia and overseas. Eddie is a graduate of the Royal Military College, Duntroon and the Army Command and Staff College, is a Fellow of the Australian Institute of Management and is currently the President, NSW Chapter of the International Society for Performance Improvement.

Peter Hancock: Huntsman Chemical Company

Peter Hancock is a Senior Human Resources Consultant with the Huntsman Chemical Company. Peter holds an Associate Diploma in Training and Development, Bachelor of Education and Training, as well as a Postgraduate Diploma in Education and Training—all from the University of Melbourne. Peter is a member of the Australian Human Resources Institute and the Australian Institute of Training and Development.

Sally Francis: Kodak Australasia

Sally Francis has worked in education in both the UK and Australia. She has spent over ten years in education in the TAFE system in Victoria. She became quality manager at Northern Institute of TAFE implementing quality systems for the six-campus college. She has worked with the Australian Quality Council where she worked as a project director providing consulting services to a broad range of organisations. In 1996 Sally joined Kodak's Human Resources Group in the Manufacturing Division working initially to support the color film business. In her current role Sally works as Human Resources Manager, Manufacturing, supporting both manufacturing and research functions. She also leads the Capability Development Centre of Excellence, co-ordinating a team of HR professionals working to provide cost-effective solutions to capability development across the company. Sally is an Australian Quality Awards Evaluator.

Denise Lloyd: Mission Australia

Denise Lloyd is National Manager, Human Resources for Mission Australia. Denise has over 15 years management experience in marketing, employment services and human resources, six of which were gained with Mission Australia. In August 1998 she was appointed to

establish and lead the Human Resources Unit. Her priorities have been the provision of specialist services that empower line management. Having achieved a Graduate Certificate in Workplace Relations, Denise is currently studying towards her Masters of Commerce, Workplace Relations, at the University of Western Sydney Nepean.

Patrick Wilson: QR

Patrick Wilson was appointed Manager of the Railway Training Centre in Rockhampton in 1992 and became involved with Train Dynamics Research with the Centre of Railway Engineering (Central Queensland University) in 1994. He became heavily involved with simulators during this period. As part of his Masters research he became interested in transfer of learning, and wrote a paper relating to co-operative learning in industry. He has authored and co-authored a number of papers on train dynamics and has made presentations to conferences such as the World Congress of Railway Research and the International Heavy Haul Conference. Patrick has spent a number of years driving heavy coal trains, Fast Freight and passenger trains. In 1998 he was awarded a Public Service Medal for his work with the simulators and action learning. Patrick holds a degree in education (Batchelor of Teaching Further Education and Training at University of Southern Queensland 1992), and completed a Masters of Education USQ in 1998.

Jeff Wapling: Target Australia

Jeff Wapling is the National Training & Development Manager for Target and Fosseys Australia Pty Ltd. Jeff is responsible for the development and delivery of training services to both brands as well as a combined head office population. This includes executive development, management training and technical/operational training for store and head office staff. Jeff's career includes 23 years working in the employment services industry, career counselling and training delivery. A practical involvement in workplace education has been a common thread in many of the positions he has held. Jeff is a qualified work place trainer and has completed postgraduate studies in Case Management and Client Services (Employment Services).

References

AQF (Australian Quality Council) 1998, *Australia–New Zealand direct line, Australian quality award winner 1998.*

Charemza, W & Deadman, D F 1997, *New directions in econometric practice*, 2nd edn, Edward Elgar, Cheltenham.

Coelli, T, Prasada Rao, D S & Battese, G E 1998, *An introduction to efficiency and productivity analysis*, Kluwer, Boston.

Coles Myer 1998, *Annual report 1998.*

Dairy Farm International Holdings Limited 1998a, *Annual report.*

Dairy Farm International Holdings Limited 1998b, *Group profile.*

Dawkins, J S 1988, *Industry training in Australia: The need for change*, AGPS, Canberra.

—— ——1989, *Improving Australia's training system*, AGPS, Canberra.

Francis, S 1998, 'Return on training investment project', company manuscript.

Frontline management development kit 1998, Prentice Hall and Australian National Training Authority, Sydney.

Gujarati, D 1995, *Basic econometrics*, 3rd edn, McGraw Hill, New York.

Hancock, P 1998, 'Return on training investment project for the VPMITB', company manuscript.

Hendry, D F 1995, *Dynamic econometrics*, Oxford University Press, Oxford.

Human Synergistics, *Life styles inventory, LSI 2, Description by others self-development guide*, Human Synergistics, New Zealand.

Keating, P 1992, *A national employment and training plan for young Australians*, statement by the Prime Minister, AGPS, Canberra.

Kirkpatrick, D 1987, Evaluation and training', in *Training and development handbook*, ed. R Craig, 3rd edn, McGraw Hill, New York.

MacDuffie, J P 1995, 'Human resource bundles and manufacturing performance: Organizational logic and flexible production systems in the world auto industry', *Industrial and Labor Relations Review*, vol. 48, no. 2, January, pp.197–230.

Mitchell, K D 1994, 'Putting evaluation to work for human resource development', *Public Productivity and Management Review*, vol. 18, no. 2, Winter, pp.199–215.

Morrison, C 1993, *A microeconomic approach to the measurement of economic performance*, Springer-Verlag, New York.

OECD (Organisation for Economic Co-operation and Development) 1997, *Human capital investment: An international comparison*, OECD, Paris.

OFTE (Office of Training and Further Education) 1997, *Return on training investment: Development of enterprise frameworks*, OFTE, Melbourne.

QR 1998, *Annual report 1997–98.*

Target, 'Information pack', company manuscript.

Wilson, P 1998, 'Train dynamics concept development', company manuscript.

The National Centre for Vocational Education Research is Australia's primary research and development organisation in the field of vocational education and training.

This is the first in a series of four publications that specifically study the financial benefits to industry of investing in training.

Other titles are *Does training pay? Evidence from Australian enterprises* by Blandy, Dockery, Hawke and Webster, *Analysing enterprise returns on training investment* by Moy and McDonald and *Training for productivity* by Maglen, Hopkins and Burke.

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